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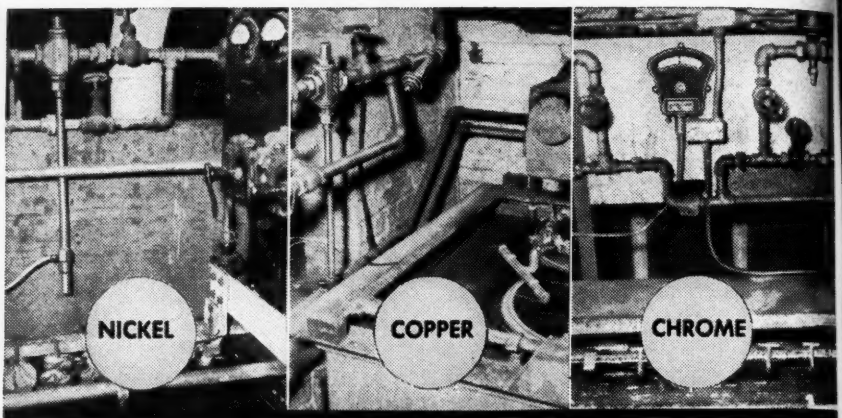

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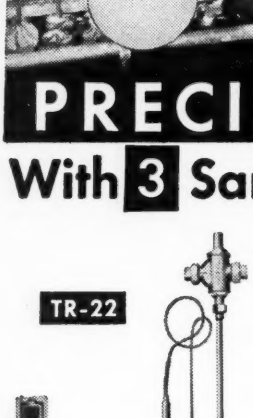
With 3 Sarco Temperature Controls



Any plating engineer knows exactly what he wants in temperatures for the various jobs going through his plant. Few realize that the very controls he needs are waiting for him and can be installed quickly at comparatively little cost.

Starting with the wash tanks he can get a suitable control in the Sarco 87 Thermoton for the cost of a good steam trap.

For greater refinements in control the Sarco TR-22 illustrated and the Sarco TR-21 control are available. For chrome he can add automatic cooling at little cost.

For most plating jobs he can keep temperatures within a degree or two with the inexpensive Sarco LSI Electric Controls.

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PF editorial

JUNE, 1949

Vol. 13, No. 9

This Plating Business

"The Business of Plating" will be emphasized at the 36th Annual Convention of the American Electroplaters' Society, to be held in Milwaukee from the 27th to the 30th of this month. The user's view of plated parts will be presented; the control of plating quality will be discussed; the job plating industry will be described; and shop inspection trips will serve to illustrate the various papers and talks.

It is indeed fitting to consider the business aspects of plating at this time. As manufacturers cast about for ways to cut product cost so that sales in a buyers' market may continue at a high level, finishing costs usually come under close scrutiny first. Particularly is the job plater the victim of keen competition and price cuts.

Therefore, it behooves the plating or finishing supervisor and the job plater to examine carefully all the means available to assist in reducing finishing costs without sacrificing quality. Many times the only way to turn loss into profit is to produce more completed parts per hour per machine. This is just as true in the case of a polishing, buffing, cleaning, or plating machine as it is of a lathe or milling machine. Therefore, serious consideration should be given to the installation of modern, efficient machinery and equipment.

Electrical equipment should be checked for the efficiency of its operation to be sure that power costs are not eating up profits.

Plating and finishing processes should be carefully studied to take advantage of recent developments and be sure that good practice is in use. One example of a recent development is the use of buffing speeds much lower than those long considered proper. When refinishing processes are improved through the use of the best methods available, reoperations, scrap, and waste are inevitably reduced and costs cut. In this connection the best efforts of engineering staffs of equipment and supply manufacturers, as well as those of process engineers and plating supervisors, should be utilized to take full advantage of new developments.

Such a program can produce substantial reductions in the cost of finished products, and will prove to be of great benefit to the plating industry, as well as to each individual plant concerned.

E. A. Blount

AMERICAN ELECTRO PLATERS SOCIETY
A·E·S
36th ANNUAL CONVENTION
MILWAUKEE
JUNE 27-30
HOTEL SCHROEDER
CONVENTION HEADQUARTERS

NATIONAL OFFICERS
AMERICAN ELECTROPLATERS' SOCIETY

The Milwaukee Branch, in sponsoring the 36th Annual Convention of the American Electroplaters' Society to be held from June 27 through June 30, has spared no efforts to make the Convention an outstanding success. The Branch, through its Convention Committtee, headed by William C. Geissman, chairman, and Henry Bornitzke, co-chairman, extends a cordial invitation to all A.E.S. members and all others concerned with finishing problems to attend the Convention and enjoy the charm, friendliness, and conviviality of Milwaukee.

A well-balanced, practical educational program has been scheduled for presentation in the Schroeder Hotel, Convention Headquarters. Subjects to be discussed in the various papers include: "The Business of Plating," "Copper, Nickel and Chromium Plating," and "Light Metal Plating and Processing." A round-table discussion on acid dips and other subjects will be conducted by Dr. William Blum. Progress reports on various A.E.S. Research Projects will be made.

Branch exhibits of plated products will form an important part of the Convention program, and may be viewed in the East Room of the Schroeder Hotel. A number of plant visits have been arranged so that those attending the Convention may gain an idea of some of the finishing procedure in use in the area.

A very enjoyable social program has been arranged for all persons attending the Convention. This will include an Open House for the men and women, to be held the first night in the Crystal Ballroom of the Hotel Schroeder, under the auspices of the International Fellowship Club. Visits have also been scheduled to the Pabst Brewery where free beer will be served. On Wednesday afternoon the International Fellowship Club will sponsor its annual golf tournament at the North Shore Country Club. For those who do not wish to play golf, a picnic and outing at Brown Deer Park has been arranged for the men and women. During two other afternoons of the Convention, the ladies are invited to enjoy Aunt Ella's Society Luncheon Party sponsored by Oakite Products, Inc., and a luncheon and style show. The outstanding social event will be the annual banquet to be held in the Crystal Ballroom of the Hotel Schroeder on the last night of the Convention.

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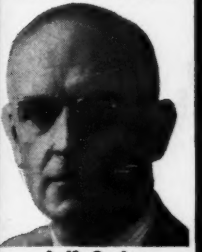

A. K. Graham
Executive Secretary

Official Program

SUNDAY, JUNE 26

4:00 P. M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

The registration fee of $10.00 entitles registrant to a book of tickets which can be used for admission to certain Convention functions and activities as listed in this program.

MONDAY, JUNE 27

8:00 A.M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

8:30 A.M.—Opening Session, Crystal Ballroom, Hotel Schroeder.

Invocation—REV. FRANK C. MESLE. Welcome to Delegates, Members and Guests—WILLIAM C. GEISSMAN, Convention General Chairman. Welcome to Milwaukee—Mayor of Milwaukee. Greetings from Milwaukee Branch—T. D. HARTSHORN, Milwaukee Branch President. First Business Session—SAMUEL S. JOHNSTON, Supreme President, Presiding.

12:00 Noon—Educational Committee Luncheon, Parlor F, Fourth Floor, Hotel Schroeder.

12:15 P. M.—International Fellowship Club's 25th Annual Luncheon, Empire Room, Hotel Schroeder.

This luncheon is exclusively for suppliers and their representatives.

2:00 P. M.—First Educational Session, Crystal Ballroom, Hotel Schroeder.

8:30 P. M.—Open House, Crystal Ballroom, Hotel Schroeder.

Music, Dancing, Buffet Lunch (Served at 10:00 P. M.). A ticket to this event, which is sponsored by the International Fellowship Club, is included in the pass book furnished to each registrant.

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★ **Fourth in a series of letters**

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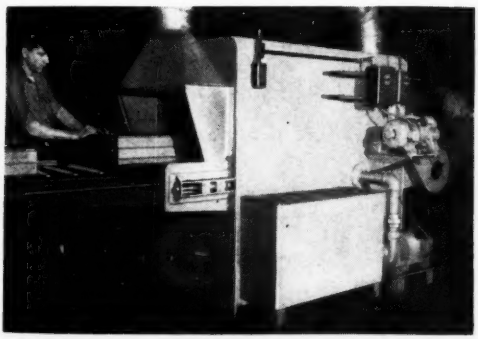

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TUESDAY, JUNE 28

7:45 A.M.—Educational Committee Breakfast, Parlor G, Fourth Floor, Hotel Schroeder.

8:00 A.M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

9:00 A.M.—Second Educational Session, Crystal Ballroom, Hotel Schroeder.

9:30 A.M.—National Association of Metal Finishers Board Meeting, Parlor E, Fourth Floor, Hotel Schroeder.

12:00 Noon—National Association of Metal Finishers' Board of Directors Luncheon, Club Rooms, Third Floor, Hotel Schroeder.

12:00 Noon—Educational Committee Luncheon, Parlor G, Fourth Floor, Hotel Schroeder.

2:00 P. M.—Third Educational Session, Crystal Ballroom, Hotel Schroeder.

6:00 P. M.—National Association of Metal Finishers' Dinner and Business Meeting, Club Rooms, Third Floor, Hotel Schroeder.

6:00 P. M.—Visit to Pabst Brewery.

WEDNESDAY, JUNE 29

7:45 A.M.—Branch Secretaries Breakfast, Hotel Schroeder.

7:45 A.M.—Educational Committee Breakfast, Parlor G, Fourth Floor, Hotel Schroeder.

8:00 A.M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

9:00 A.M.—Fourth Educational Session, Crystal Ballroom, Hotel Schroeder.

12:00 Noon—International Fellowship Club Golf Tournament, North Shore Country Club.

Joseph J. Duffy, Jr., Pennsylvania Salt Mfg. Company, Chairman. Transportation should be arranged through the Golf Committee. Prizes will be awarded. An informal luncheon will be served at the Club between 12:00 Noon and 1:30 P. M. Tee-off time is between 1:00 P. M. and 2:00 P. M.

12:15 P. M.—Picnic and Outing, Brown Deer Park.

Luncheon, Music, Entertainment. Buses leave Hotel Schroeder from Fifth Street (East) entrance. A ticket to this event is included in pass book.

2:00 P. M.—Research Committee Meeting, Parlor F, Fourth Floor, Hotel Schroeder.

6:30 P. M.—Research Committee Dinner, Parlor G, Fourth Floor, Hotel Schroeder.

7:00 P. M.—Visit to Pabst Brewery.

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THURSDAY, JUNE 30

7:45 A.M.—A.E.S. Research and Educational Committee Breakfast, Hotel Schroeder.

8:00 A.M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

9:00 A.M.—Fifth Educational Session, Crystal Ballroom, Hotel Schroeder.

2:00 P. M.—Final Business Session, East Room, Hotel Schroeder.
President S. S. Johnston, Presiding.

7:00 P. M.—Annual Banquet, Crystal Ballroom, Hotel Schroeder.
Dinner, Awards, Entertainment, Music, Dancing. A ticket to this event is included in the pass book furnished to each registrant.

* * *

PLANT VISITATIONS

A popular feature of the Annual Convention of the A.E.S. is being reinstated this year in the form of plant visitations. At Glove Union, Inc., visitors will see the fabrication, finishing, and assembly of roller skates. The Body Division of Nash Kelvinator Company will provide an interesting view of assembly lines for the Nash automobile bodies. Convention registrants will also have an opportunity to visit the X-Ray Division of the General Electric Company. All of these plants are located in Milwaukee.

Omer N. Doyle, chairman of the plant visits for the Milwaukee Branch, has announced that all convention registrants will be given an opportunity to register for the trips which they propose to take.

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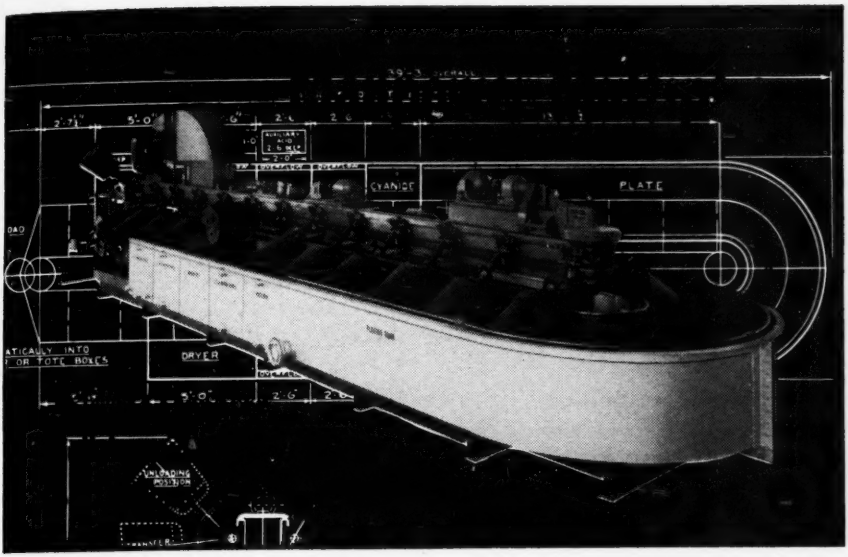

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Ladies' Committee—Mrs. R. F. McGuire, Chairlady; Mesdames Robert Steuernagel; A. F. Johnson; Glen Schwemer; Rodney Olsen; T. D. Hartshorn; W. C. Geissman; Vincent Mattacotti; Leslie Diveley; Henry Bornitzke; Jack Geissman; Phil Ritzenthaler.

Program—Theodore D. Hartshorn, Chairman.

Educational—Leslie Diveley, Chairman; Fred L. Anderson; Vincent Mattacotti; Phil J. Ritzenthaler; Louis J. Schustic; Frank Schrand; Charles W. Wheeler.

Branch Exhibits—Eugene C. Bosl, Chairman; Porter Alvested; Winchester Cook.

William C. Geissm
Chairman

Hen
Co

R. F. McGuire | Mrs. R. F. McGuire | Axel F. C. Johnson

Robert Steuernagel | Omer N. Doyle | Rodney Olsen | Eugene C. Bosl

Convention Committees

C. Geissm
airman

Henry Bornitzke
Co-Chairman

Registration—Frank J. Marx, Chairman; Harry J. Krueger.

Entertainment—John A. Davis, Chairman; Wm. J. Lawrie.

Luncheon—Axel F. C. Johnson, Chairman.

Banquet—Rodney H. Olsen, Chairman; Walter Vogel, Co-Chairman; Robert J. Baltzell; Kenneth Olsen.

Outing—R. F. McGuire, Chairman; Si Bivins.

Hotel Reservations—Glen A. Schwemer, Chairman.

Hotel—Everett N. Robinson, Chairman; Arthur J. Noel.

Plant Visitations—Omer N. Doyle, Chairman.

Finance—Robert J. Steuernagel, Chairman.

Publicity—Vincent Mattacotti, Chairman; L. J. Moyes.

ıson

Vincent Mattacotti Theodore D. Hartshorn Leslie Diveley

l

John Davis Everett N. Robinson Glen A. Schwemer Frank Marx

Ladies' Program

SUNDAY, JUNE 26

4:00 P. M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

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8:00 A.M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

2:30 P. M.—Tea, Empire Room, Hotel Schroeder.

8:30 P. M.—Open House, Crystal Ballroom, Hotel Schroeder.

Music, Dancing, Buffet Lunch (Served at 10:00 P. M.). A ticket to this event, which is sponsored by the International Fellowship Club, is included in the pass book furnished to each registrant.

TUESDAY, JUNE 28

8:00 A.M.—Registration, Foyer, Fourth Floor, Hotel Schroeder.

Forenoon —Open.

1:00 P. M.—Aunt Ella's Society Luncheon Party, Empire Room, Hotel Schroeder.

Sponsored by Oakite Products, Inc., D. X. Clarin, Secretary.
This event includes an excellent luncheon and entertainment.

8:00 P. M.—International Fellowship Club's "Plato" Party, Crystal Ballroom, Hotel Schroeder.

Under the direction of Joan Trumbour Wiarda. Prizes.

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Solution

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Ladies' Program

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The Bullard Clark Company
DANIELSON, CONNECTICUT

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7:00 P. M.—Annual Banquet, Crystal Ballroom, Hotel Schroeder.

Dinner, Awards, Entertainment, Music, Dancing. A ticket to this event is included in the pass book furnished to each registrant.

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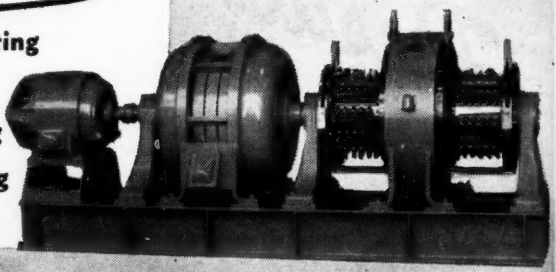

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Educational Program

FIRST SESSION

Monday Afternoon, June 27, 2:00 P. M.
Crystal Ballroom, Hotel Schroeder

WALTER L. PINNER, Houdaille-Hershey Corporation, Presiding

1—"The Customer Looks at Plated Products."
By THOR H. WESTBY and R. E. PARKINSON, Sears, Roebuck and Co.

2—"Quality Control in Electroplating."
By R. E. HARR, Western Electric Company.

3—"The Job Plating Business."
By RAYMOND M. SHOCK, National Association of Metal Finishers, Inc.

4—"Availability of Plating Materials."
Short presentations of the outlook on availability of:

"Alkalies, Including Silicates and Phosphates."
By J. J. DUFFY, JR., Pennsylvania Salt Mfg. Co.

"Cadmium."
By L. K. LINDAHL, The Udylite Corporation.

"Chromic Acid and Chromates."
By HENRY MAHLSTEDT, United Chromium, Inc.

"Cyanides."
By ED McGOVERN, E. I. du Pont de Nemours & Co.

"Lead."
By CHARLES R. INCE, St. Joseph Lead Company.

"Nickel."
By CLARENCE H. SAMPLE, The International Nickel Co.

"Tin."
By DR. B. W. GONSER, Tin Research Institute, Inc.

"Zinc."
By RALPH F. BURNS, The New Jersey Zinc Sales Co.

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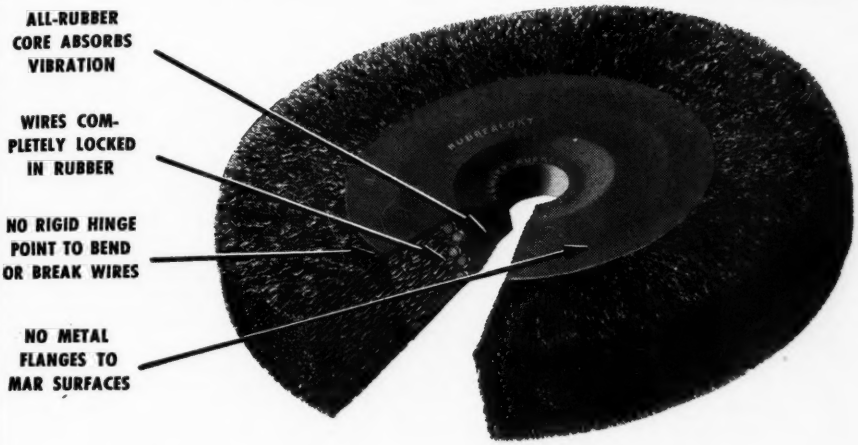
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Better Flare Control—Special rubber flange won't let wires bend or mat down. *Gives brush longer usable life!*

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Abstracts of Preceding Papers

The Customer Looks at Plated Products—Thor H. Westby and R. E. Parkinson.

A general discussion is offered of characteristics of plated products that the consumer desires, whether or not he has been getting what he wants, and what the plating industry and distributors of products can do to set sensible specifications and to control quality so as to meet these specifications.

Quality Control in Electroplating—R. E. Harr.

This paper deals with (1) maintenance of solutions and equipment, including tests and additions to control major solution constituents, spectrographic and other tests for kind and amount of impurities, and rack design and maintenance; (2) inspection, including use of Magne-gage and sectioning to determine deposit thickness, relation of minimum to maximum deposit thickness, establishment of control limits for thickness and use of control charts in maintaining it within such limits, and finish allowances for threaded parts.

The Job Plating Business—Raymond M. Shock.

The role of the job shop in the industry, the present status of activity and profits in the job shop business, outlook for the future, and services rendered by job shop organizations are subjects of this paper.

Availability of Plating Materials—Eight speakers.

Background information, present situation, and future prospects will be presented.

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. . . reports Factory Manager

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Detroit 11, Michigan

February 24, 1949

Gentlemen:

We have had our Udylite automatic plating machine in operation for approximately two years, and its performance has been so outstandingly satisfactory that we feel we should compliment you on this machine. It has exceeded our fondest expectations in every respect,

The following is a list of its performance characteristics that I feel more than vindicate our judgment in its purchase.

1. Quality - The quality of the plating has been excellent as proved by the elimination of rejects due to faulty plating and by the fine appearance of the work. The addition of the bright dipping step has made for a very bright and clean appearance of the parts and has elicited comments from a number of sources.

2. Labor Saving - The machine has proven a great labor saver, From the standpoint of direct labor alone, it has more than paid for itself.

3. Uniformity - The uniformity of finish, both as to thickness and appearance, is remarkable, and the ability to hold plated parts to extremely close tolerances has been a great help in assuring the satisfactory performance of our calculator machines.

4. Maintenance - We have had no major breakdowns whatsoever and practically no maintenance problems have appeared to date. All the working parts are readily accessible, and peridoic inspection has shown that the machine properly serviced and lubricated should have an extremely long life.

5. Inspection - The high quality and fine uniformity of plating has cut down our inspection costs to a minimum.

6. Blind holes - In our product we have a number of blind holes which formerly gave us trouble due to rusting. This has been eliminated by the Udylite method of drying parts.

The above facts may seem extremely complimentary and, frankly, they are intended to be, for the Udylite fully-automatic plating machine is one of our proudest possessions and one which has certainly paid off in quality, productivity, and dollars' and cents' savings.

Very truly yours,

FRIDEN CALCULATING MACHINE CO., INC.

Dunstan S. Gross

Dunstan S. Gross
Factory Manager

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THE Udylite CORPORATION
DETROIT 11, MICHIGAN

SECOND SESSION

Tuesday Morning, June 28, 9:00 A.M.

Crystal Ballroom, Hotel Schroeder

FRANK K. SAVAGE, Star Silver Plating Company, Presiding

1—"PR Cyanide Copper Plating."
By GEORGE W. JERNSTEDT, Westinghouse Electric Corporation.

2—"Electrodeposition of Nickel at High Current Densities."
By W. A. WESLEY and W. W. SELLERS, The International Nickel Co., and E. J. ROEHL, The Thomas Steel Co.

3—"Factors That Influence Operating Characteristics of Chrominum Baths."
By J. B. WINTERS and R. O. HULL, R. O. Hull & Company.

4—"Scratch Hardness and Abrasion Hardness of Electrodeposited Chromium."
By J. M. HOSDOWICH, United Chromium, Inc.

Abstracts of Above Papers

PR Cyanide Copper Plating—George W. Jernstedt.

Conditions, including time cycles and ratios, solution composition, addition agents, etc., are given for the application of PR to cyanide copper plating. A description of the first inorganic high-speed cyanide solution is given. Examples of the smoothening possible with this process are shown. The method of obtaining various physical properties, especially hardnesses from 100 to 220 Vickers with excellent ductility, is explained. A description of commercial equipment as now available is given.

Electrodeposition of Nickel at High Current Densities—W. A. Wesley, W. W. Sellers and E. J. Roehl.

The theory of limiting current densities was applied to nickel deposition and led to the conclusion that it is theoretically possible to plate nickel at rates as high as 8500 asf. The practical limit would, therefore, be set not by electrochemical factors but by such engineering requirements as maintenance of an adequate rate of motion of the electrolyte versus the cathode surface, prevention of overheating of contracts, electrolyte and cathode, etc. Electrochemical data are presented which should be useful in designing equipment for high speed nickel plating.

Factors that Influence Operating Characteristics of Chromium Baths—J. B. Winters and R. O. Hull.

This paper deals with the wide variation in results obtained in chromium plating, particularly over nickel. Among the factors that influence the successful applications of chromium over nickel are the kind of nickel—gray or bright—addition agents in bright or gray nickel, activation of nickel before chromium plating, passivity of nickel developed after plating either by use of improper transfer cycles or in the chromium bath itself, which is influenced by bath composition (sulfate ratio and strength) and temperature, and time of immersion in the chromium bath before current is applied.

Scratch Hardness and Abrasion Hardness of Electrodeposited Chromium—J. M. Hosdowich.

The scratch hardness of chromium electrodeposited under a wide range of conditions was determined by means of the Bierbaum microcharacter. The abrasion hardness of the electrodeposited chromium was determined by means of an automatic machine in which a grinding wheel was intermittently brought in contract with the test piece. A conclusion of practical value to the plater is that both the scratch hardness and the abrasion hardness of any chromium deposit can be accurately estimated from its appearance.

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THIRD SESSION

Tuesday Afternoon, June 28, 2:00 P.M.
Crystal Ballroom, Hotel Schroeder

DR. WILLIAM BLUM, National Bureau of Standards, Presiding

Round Table Discussion on Acid Dips in Cleaning Cycles and Other Subjects.
Short Introductions of Main Subject:

"Acid Dips for Ferrous Metals."
By IVAN C. HEPFER, Furniture City Plating Company.

"Prevention of Embrittlement of High-Carbon Steel."
By DR. RICHARD M. WICK, Bethlehem Steel Company.

"Acid Dips for Copper and Copper-Base Alloys."
By B. H. McGAR, Chase Brass & Copper Company.

"Acid Dips for Zinc-Base Metals."
By DWIGHT M. OVERCASH, Brown-Lipe-Chapin Division, GMC.

Abstracts of Above Papers

Acid Dips for Ferrous Metals—Ivan C. Hepfer (Introduction to Round Table Discussion).
Important basic-metal and solution factors, especially those of a controversial nature, are presented.

Prevention of Embrittlement of High-Carbon Steel—Richard M. Wick (Introduction to Round Table Discussion).
Treatment cycles for minimum embrittlement and for hydrogen removal are discussed.

Acid Dips for Copper and Copper-Base Alloys—B. H. McGar.
Pickling, stain-removal, and bright-dipping methods are treated.

Acid Dips for Zinc-Base Alloys—Dwight M. Overcash.
Brief literature survey is made and questionnaire data are given showing present practices in the field.

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FOURTH SESSION

Wednesday Morning, June 29, 9:00 A.M.
Crystal Ballroom, Hotel Schroeder

K. GUSTAF SODERBERG, "Plating" Magazine, Presiding

1—"Plating on Aluminum."
By FRED KELLER, Aluminum Company of America.

2—"Cleaning, Acid Treatment, and Plating Upon Aluminum."
By DR. WALTER R. MEYER and STEVEN H. BROWN, Enthone, Inc.

3—"Amorphous Phosphate Coatings for Protection of Aluminum Alloys and for Paint Adhesion."
By ALFRED DOUTY and F. PALIN SPRUANCE, JR., American Chemical Paint Company.

4—"Electroplating on Magnesium and Its Alloys."
By HERBERT K. DeLONG, The Dow Chemical Company.

Abstracts of Above Papers

Plating on Aluminum—Fred Keller.

The most commonly used process for preparing aluminum for plating, the alkaline zinc immersion process, will be discussed in detail, including effects of surface finishing, structure, and composition of the aluminum alloy. The beneficial effect of chromium over nickel in reducing corrosion of underlying aluminum will be demonstrated.

Cleaning, Acid Treatment and Plating upon Aluminum—Walter R. Meyer and Steven H. Brown.

Precleaning, alkaline cleaning, etching, chemical polishing and brightening, and electroplating of aluminum will be treated.

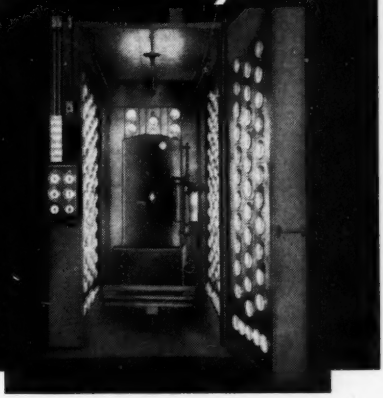
Amorphous Phosphate Coatings for Protection of Aluminum Alloys and for Paint Adhesion—Alfred Douty and F. Palin Spruance, Jr.

Details of a new process for treating aluminum alloys and characteristics of the new coatings are given. Data are presented on effects of treatment conditions on coating weight; resistance of painted and unpainted coatings, alone and in contact with dissimilar metal, to outdoor exposure and salt fog test; and adhesion of baked and air-dried paint systems.

Electroplating on Magnesium and its Alloys—Herbert K. DeLong.

This paper furnishes details of cleaning and pickling, final oxide removal and deposition of an adherent zinc film from a pyrophosphate-fluoride zinc dip, copper striking, plating (including barrel plating), as well as stripping methods. Data on outdoor, salt-spray and humidity exposure of silver and copper-nickel—chromium plated panels are also presented.

Reports Savings of $15 per unit on Finishing Since Installing JENSEN Infra-Red Oven



LOWERED COSTS on finishing is only one of the many advantages reported by Detrex Corporation, Detroit, since installing a Jensen infra-red oven to paint bake Detrex dry cleaning equipment. Detrex now saves over $15 per complete unit on extra handling alone, as compared with the old air-dry method. Detrex processes pieces as small as 1" x 3" . . . units as large as 54" x 36" x 6'. The Jensen oven handles all shapes, all sizes. Jensen's "nested lamp" arrangement enables Detrex to achieve an ideal wrinkle finish on steel, brass, aluminum and galvanized iron.

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In Finishing Production . . . the Future Belongs To Men Who Plan For It!

FIFTH SESSION

Thursday Morning, June 30, 9:00 A.M.
Crystal Ballroom, Hotel Schroeder

DR. LOUIS WEISBERG, Consultant, Presiding

1—"Distribution of Electrodeposited Metal on Some Simply Shaped Cathodes."

A Contribution from A. E. S. Research Project No. 11.

By DR. JOHN KRONSBEIN and LESTER C. NORTON, Evansville College.

2—"Outstanding Problems of Porous Structure in Electrodeposits."

A Contribution from A. E. S. Research Project No. 6.

By DR. N. THON, Princeton University.

3—"The Present Status of Plating Room Waste Disposal."

A Contribution from A. E. S. Research Project No. 10.

By DR. BARNETT F. DODGE, Yale University.

Abstracts of Above Papers

Distribution of Electrodeposited Metal on Some Simply Shaped Cathodes—John Kronsbein and Lester C. Norton.

Simple, non-mathematical language is used to describe the predictions from theoretical considerations as to how electrodeposited coatings are distributed over cathodes of simple shapes under specified ideal conditions, to discuss reasons for predictable and unpredictable deviations of this distribution as encountered under experimental conditions and in the plating shop, and to give some comparisons of theoretical and experimental results.

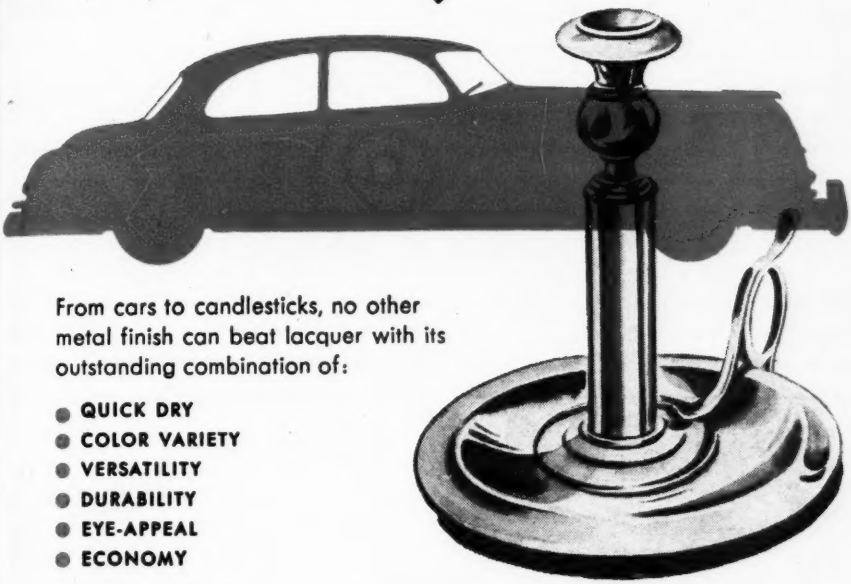
Outstanding Problems of Porous Structure in Electrodeposits—N. Thon.

The different types of porous structures found in electrodeposits and the factors associated with such structures are discussed. The nature of the metal, thickness of the deposit, conditions of plating, and conditions of the surface on which the deposit is formed are considered. Measurements of permeability to air and other gases, permeability to cathodic hydrogen, hydrogen occlusion and adsorption, as well as electron diffraction studies of crystal structure are necessary steps in the attack on this problem.

The Present Status of Plating Room Waste Disposal—Barnett F. Dodge.

A number of plants for disposal of all kinds of plating waste will be shown in slides and described.

LACQUER



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BRANCH EXHIBITS OF PLATED WARE

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This year the exhibit spotlight is entirely on the products of the platers' skill. As the only exhibits of the 36th Annual Convention of the A.E.S., the branch exhibits of plated ware have been given an outstanding display location in one of the attractively appointed banquet rooms of the convention headquarters hotel, the Schroeder.

Again, as in the past several years, the branches are competing for the honor of having a prize-winning exhibit. An impartial committee composed of representatives of five different branches will have the unenviable task of selecting the three best exhibits. A visit to the branch exhibits of plated ware will be well worth the while of everyone in attendance at the convention and will be a tribute to those branches cooperating in the exhibit.

TIME SCHEDULE FOR BRANCH EXHIBITS

Monday, June 27	12:00 Noon to 6:00 P. M.
Tuesday, June 28	9:00 A.M. to 6:00 P. M.
Wednesday, June 29	9:00 A.M. to 12:00 Noon

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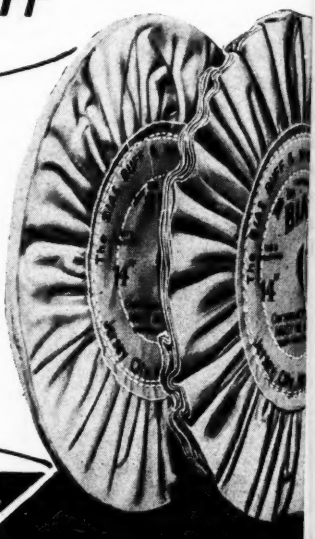
The long lasting quality of our BIAS Buff—wearing right down to the very core, good until entirely used up—has been a real source of satisfaction to our customers. This feature plus the high efficiency and unusual economy of our Buffs keep them in the forefront of the metal finishing industry.

We suggest that you try them on your work. Also write us on your business stationery for our new Catalog.



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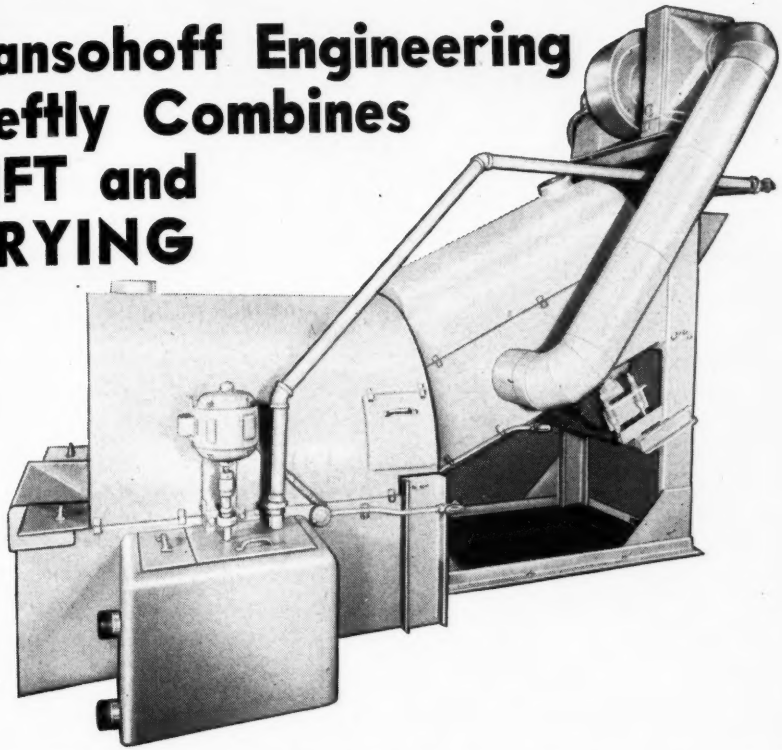

This ingenious Washing and Drying Unit, developed from proved Ransohoff components and principles, operates between stamping presses and weighing scales. Steel stampings are fed into the washing cylinder at the rate of thousands per hour. Inside worm carries stampings through the washing section and into an inclined rotating screen drum with worms wherein the stampings are dried while they are being lifted to the hopper of the weighing scales. Combining of drying and lift-conveying saves space, handling, equipment!

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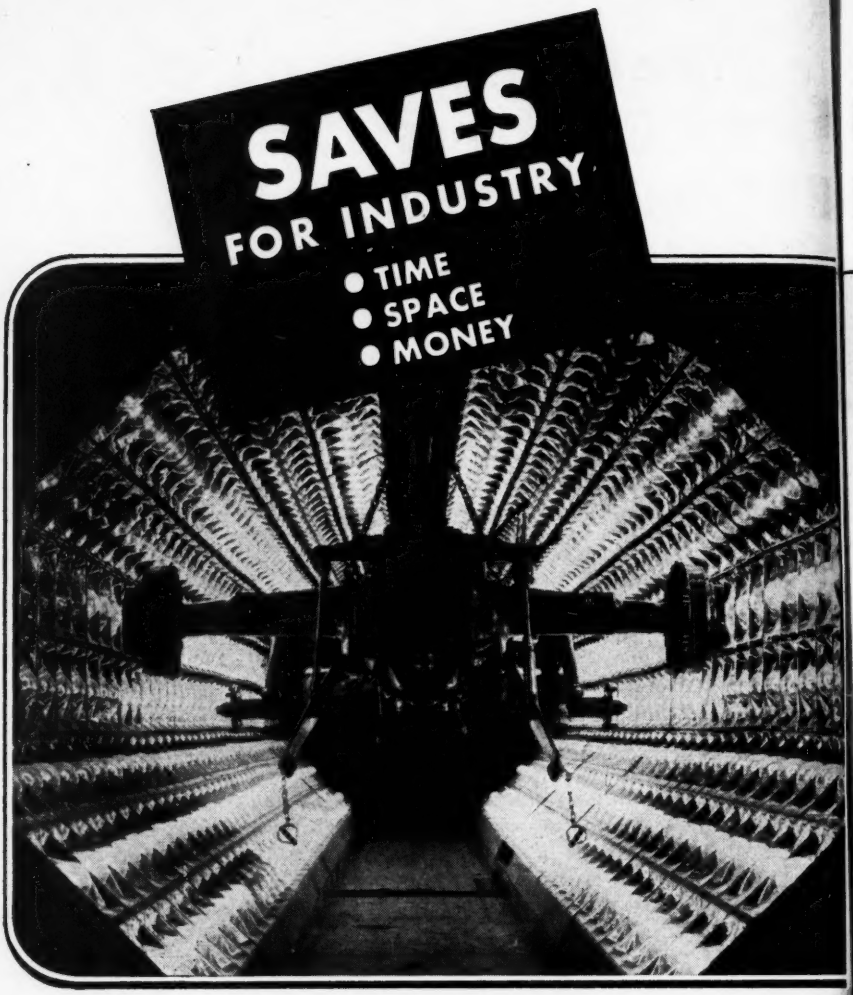

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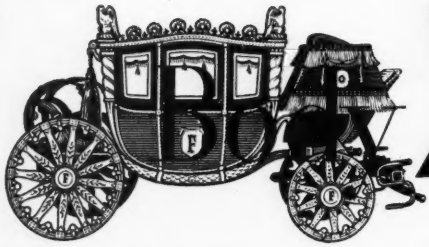

FINISHING by Fisher

By Ezra A. Blount

FEATURE

Typical of Fisher Body assembly plants located throughout the United States is the Norwood, Ohio, plant of the Fisher Body Division, General Motors Corporation. Here closed bodies for Chevrolet motor cars are produced by approximately 670 employees in a two-story plant containing approximately 45,000 square feet of floor space in which convenient arrangement of equipment and efficient utilization of facilities are combined with conveyorized handling and straight-line process flow, long characteristic of automobile production. The Fisher Body plant joins the plant of the Chevrolet-Norwood Division, GMC, where the bodies are assembled to frames and where the completed automobile is produced.

Steel body sections from Fisher Body fabricating plants located in Grand Rapids, Michigan, Cleveland, Ohio, or Hamilton, Ohio, are unloaded from freight cars or trucks on one side of the Norwood, Ohio plant. The steel stampings progress through spot welding sub-assembly bays so that the sub-assemblies can be joined to form the completed body on a conveyor line located at right angles to the sub-assembly bays.

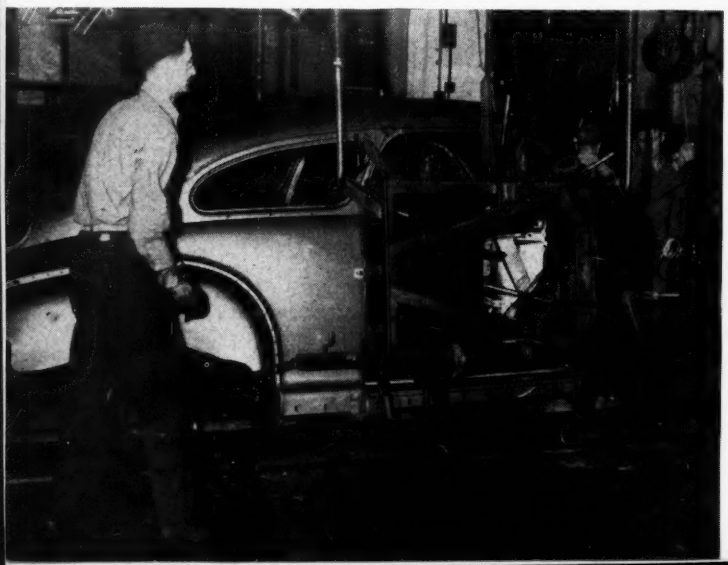

Fig. 1 — Illustration shows "gates" attached to a Chevrolet sedan body so that final welding operations can be performed.

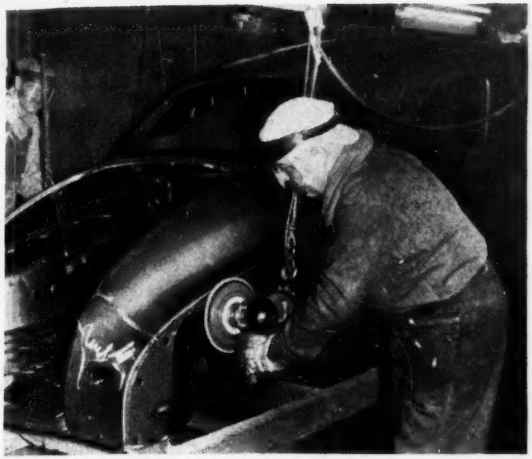

Fig. 2—In a curtained booth, using an abrasive disc mounted in a counterbalanced high-cycle grinder, the operator is shown metal finishing welded surfaces. A plastic face mask protects the operator's eyes from flying particles.

The principal body components—the underbody, the balloon assembly, and the shroud—are joined on body trucks by a combination of spot welding and torch welding to form the body assembly. The body trucks which carry the bodies through the entire manufacturing and finishing operation are equipped with rollers and with lugs which can engage the power-driven chain floor conveyors to transport the body back and forth across the plant through the various finishing and assembly operations.

To ensure the accuracy of body construction, the proper fitting of the car doors and proper alignment of all elements of the body, huge welding jigs or "gates," as they are called, are inserted in the door openings and braced at the proper angle. Body spot and torch welding is then completed and the body emerges from this operation completely braced and reinforced so that it can be assembled without difficulty to the chassis of the particular car of which it is to be a part. Figure 1 shows a body completely braced ready for final welding.

Torch welded seams are metal finished with counterbalanced high-cycle electric disc grinders, as illustrated in Fig. 2. This operation is supplemented by the "running in" of solder to render the connection invisible after the

Fig. 3 — View of the booth in which solder joints are smoothed with counterbalanced power-driven grinding tools. At the left of the photograph may be seen one of the glass walls down which a water curtain continually flows. Operators are protected by face shields mounted in hoods to which fresh air is continually supplied.

Fig. 4—Bodies, completely metal finished, are conveyed through the rust-proofing tunnel by a floor conveyor.

body has been painted. The solder joints are subsequently smoothed in a grinding booth fitted with glass sides so that a water curtain may be maintained on either side. This operation is shown in Fig. 3. After the car doors are hung, two men working as a team complete metal finishing operations.

After the bodies are metal finished, they are processed through a six-stage spray rust-proofing unit. Temperatures of the various circulating solutions are maintained automatically and the solution compositions of the various processing solutions are checked with the aid of a conveniently located chemical analysis cabinet equipped with the various testing solutions required for the purpose. Figure 4 pictures a body at the entrance of the rust-proofing tunnel.

After the bodies are rust-proofed, they are dried in a steam heated drying oven. Following this operation, the bodies are carried from the first floor of the plant up an inclined conveyor to the second floor. This inclined conveyor carries the bodies over and through a water-wash spray booth so that an operator may prime the underbody of the car.

When the bodies reach the second floor of the plant they pass through

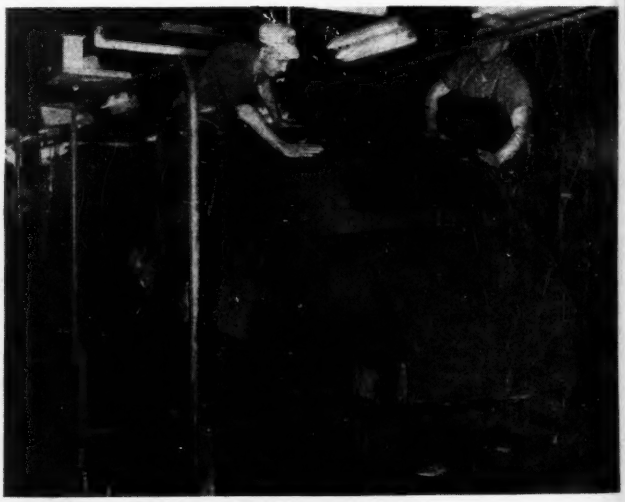

Fig. 5 — View of the wet sanding area in which the upper portions of the glazed body are smoothed

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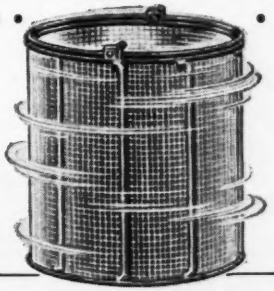

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***Only 2 simple steps required . . .**

(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON."

(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

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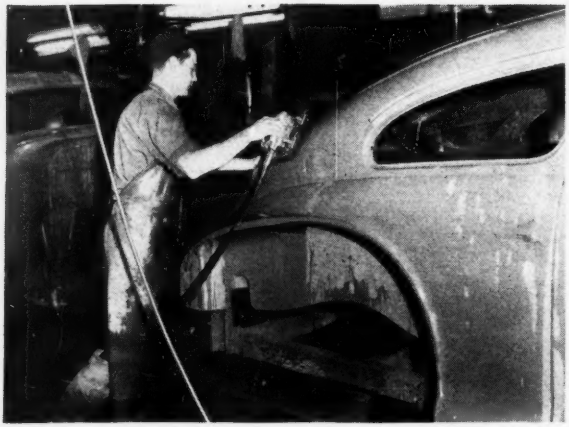

Fig. 6—Lower portions of the body are wet sanded by operators working at floor level using air-operated sanders on those areas of uniform curvature.

three water-wash spray booths in succession so that priming operations may be completed. In the first booth the inside of the body is primed and in the two booths following, the sides and top of the body are primed. The same primer used for the underbody is used for the remainder of the priming operation. Following priming, the bodies are dried in a gas-fired oven.

To ensure resistance of all parts of the body to rust, the recesses where moisture might collect, such as the door recess and the rocker panels, are primed also through the use of special spray gun tips.

After bodies receive the priming coat and are baked, a second coat, called a glaze, is applied to form a smooth base for subsequent application to finish lacquer. The first operation in this process consists of the automatic spraying of the body roof with a traveling spray gun controlled by an electric eye. As the bodies pass below the gun, the electric eye actuates the spraying mechanism and the glaze is applied automatically. After the roof is sprayed, the spraying mechanism is shut off automatically. Following the automatic roof spraying operation, the remainder of the exterior of the body is sprayed in a three-section water-wash spray booth. Following the glazing operation, bodies are baked in a gas-fired oven.

As bodies emerge from the glaze baking oven, they progress through a wet sanding operation. This operation is shown in Figures 5 and 6.

Water is sprayed continually on the

Fig. 7—After the lower half of a two-tone body has been sprayed and a strip of masking paper applied, the upper portion of the body is sprayed with a contrasting color.

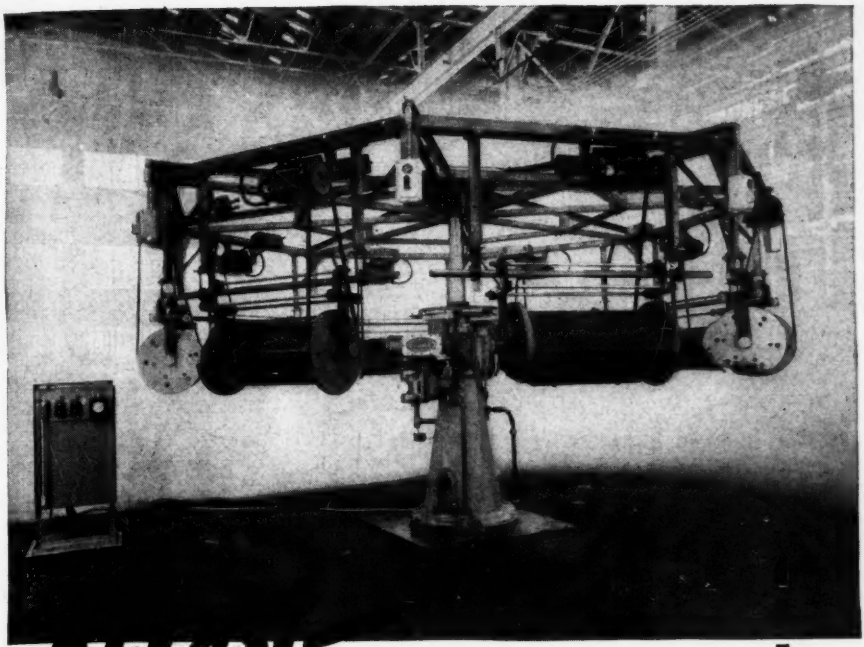

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Fig. 8—With a long tube attached to a paint gun, a wax and oil base anti-corrosive material is sprayed inside the full length of each rocker panel.

exterior body surfaces during the sanding operations. Following the wet sanding operation, bodies are dried in a steam heated oven.

Pyroxylin lacquer is used for the finish coats. The final finish consists of six coats of spray lacquer. The lacquer is sprayed in open spray booths constructed for overhead exhaust. Make-up air is delivered through filters at working height on each side of the spray booths. The air then flows down at the sides of the booth towards the center and up through the top of the booth, carrying with it any lacquer overspray. The efficiency of this system is demonstrated quite forcibly by the fact that two-tone bodies may be sprayed with only a narrow section of masking paper to keep the paint applied to the upper half of the body from spotting the lower half, as shown in Figure 7.

Colors are scheduled and spaced so that operators will have time to change guns and to perform necessary masking operations on two-tone bodies. In the lacquer spraying operation, as in the glaze spraying operation, automatic traversing spray guns are used to spray the body roof.

As bodies emerge from the final baking oven, a wax and oil base material is applied in the bottoms of the door recesses and the rocker panels, as shown in Fig. 8, as a further insurance against corrosion in these

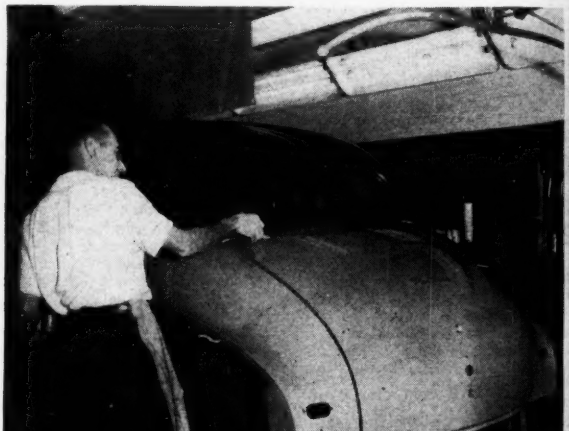

Fig. 9—Just before the body is inspected by final inspectors, panel edges are reinforced to provide added resistance against the technical damage which these areas experience in service.

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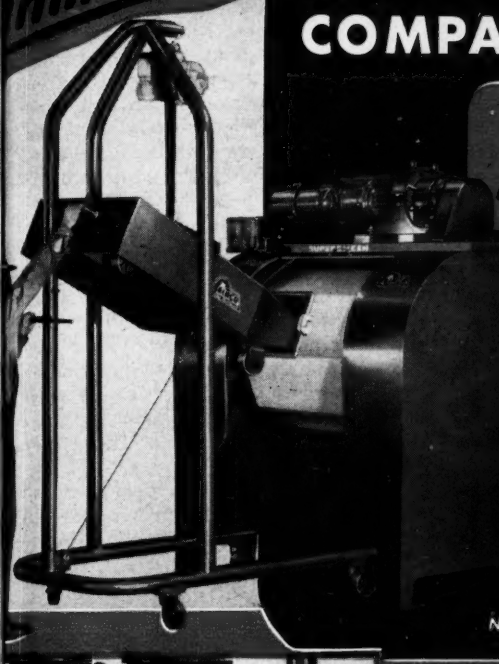

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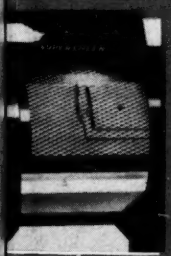

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areas resulting from moisture accumulation. The bodies then progress to the trim shop where windows, trim strips, upholstery, and all the other body components are assembled.

The next finishing operation consists of application of a polishing compound. This is polished with counterbalanced high-cycle electric power buffers. The final finish polishing operation is performed in a glass walled polishing booth where water curtains are employed to reduce air-borne dust. Here the surface of the body is given a final gloss.

Throughout the trimming, polishing, touch-up, and inspection areas fluorescent lights mounted both horizontally overhead at a 45-degree angle and vertically on pedestals approximately 30 inches high along the sides of the body conveyors provide illumination so that possible defects in the surface finish are easily detected.

A final spot polish and clean-up operation, to which may be added edge reinforcement of various sections, completes the body manufacturing process. Figure 9 is a view of the area where final touch-up operations are performed. The Fisher Body plant has no product delivery problem because the end of the body finishing and inspection lane is located near the storage area in the adjoining plant of the Chevrolet division. Therefore, bodies once accepted by the Chevrolet inspectors are merely pushed across a short span of floor and are then ready for assembly into the completed car.

Paint for the spray lacquer operations is formulated and mixed in a paint mixing room, and then piped to the various locations in the spray booths where it is to be used. It is continually circulated through a filter and through agitated mixing tanks installed in duplicate so that uniform-

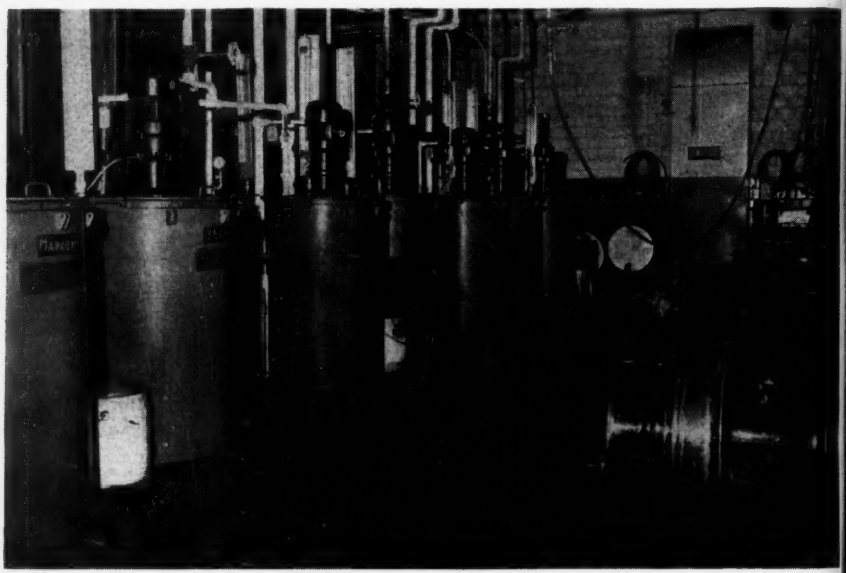

Fig. 10—View of the lacquer mixing room showing the mixing and circulating tanks in the foreground and at the right the drum rotator used to mix lacquer thoroughly before it is added to the paint circulating and delivery system

Two 2000-lb. rack-loads of enamel-sprayed metal parts are baked every two hours by each of these four DESPATCH Ovens. Racks are either mounted on floor trucks or suspended from a monorail conveyor. Note heaters mounted on platform above each oven to save floor space.

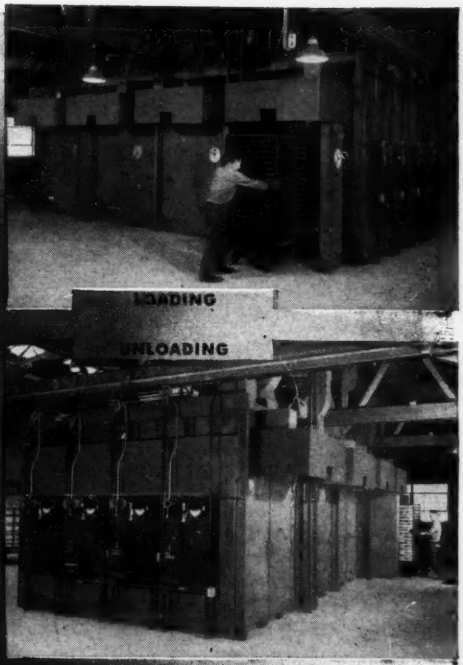

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Fig. 11—In a special water - wash spray booth, bodies are sprayed with special colors formulated according to customer specifications.

ity of paint both as to consistency and color is maintained. In preparing a "batch" of paint, thinner is added to the mixing tank from a pipe line connected by a pump to the thinner storage tank buried in the ground just outside the plant proper, until the proper weight of thinner is obtained. Figure 10 is a view of the paint mixing room.

In addition to the production line spray booths designed and engineered by Fisher Body Division engineers, there is a special water-wash spray booth shown in Fig. 11. This has been installed for spraying special colors for which the volume production is not sufficient to warrant their adoption as standard. This booth is located near the entrance to the lacquer spray booth so that bodies may be sprayed and then returned to the power-driven floor conveyor for processing through the remaining operations.

Through exhausts located near oven entrances and exits, fumes are removed by exhaust fans located on the plant roof, thus keeping objectionable odors out of the plant. Likewise, steam from the rust-proofing installation and air from the water-wash spray booths are exhausted, the the latter by two 45,000 c.f.m. exhaust fans. The exhaust from the lacquer spray booths, contaning paint overspray, is washed in three huge air washers, each of 100,000 c.f.m. capacity, located on the plant roof. The efficiency of paint removal is demonstrated by the cleanliness of the exhaust fans and adjacent roof area. To replace the air exhausted from various parts of the plant, three controlled temperature make-up air heaters blow warmed air into the plant. Air for the lacquer spray booths, filtered twice, is delivered directly along the sides of the booths.

Employees are encouraged to submit suggestions for improving working conditions and plant safety through the General Motors Suggestion Plan. Awards are made for those suggestions adopted. Thus, plant safety joins with sound plant engineering and alert supervision to achieve efficient production and finishing of Chevrolet bodies by Fisher.

"What Enamelers & Japanners Can Do For You" is the title of a 20-page booklet prepared by Enamelers & Japanners, 3022 N. Rockwell St., Chicago 18, Ill., which pictorially presents its three plants and the extensive equipment and modern processing methods used in job finishing by enameling or japanning of manufactured products. Copy free.

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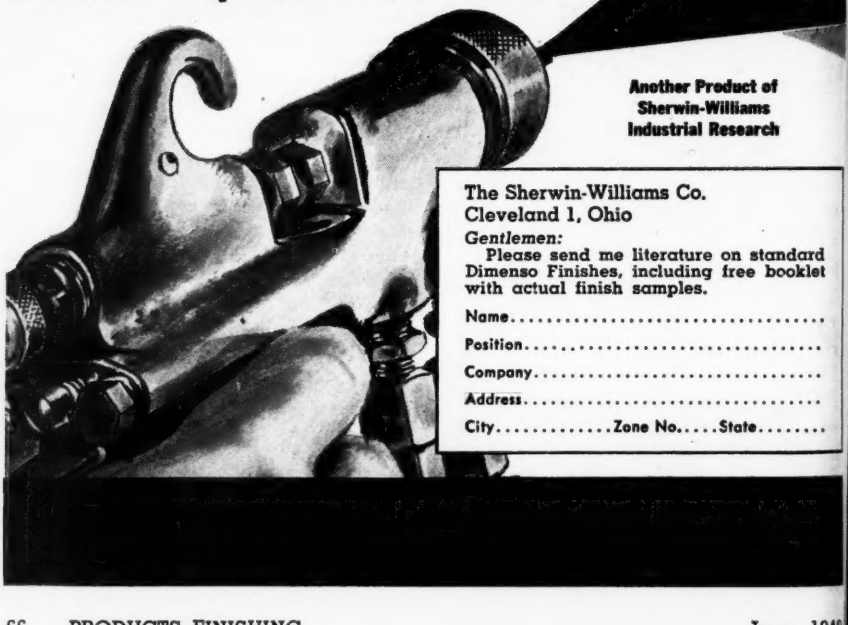

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Finishing Clinic

In this department are presented some of the questions submitted by readers together with suggested solutions of the problems outlined.

Question. *We are contemplating the installation of two tanks to be used for silver plating and would appreciate your opinion as to what type of tank would be best for this purpose.*

W. G. C.

Answer. A great deal of commercial silver plating is carried out successfully in ordinary steel tanks of welded construction. It is important to keep the silver solution free from chlorides to prevent attack of the tank material. Steel tanks having synthetic linings, such as rubber, Koroseal, and similar materials, are entirely satisfactory. The most economical set-up would involve the use of a welded steel tank coated on the outside with a good corrosion resistant paint. If you care to go to the expense of having your tank lined with one of the synthetic lining materials, it would be worth-while to have both the inside and outside lined to make for an attractive corrosion resistant installation. A. G. G.

Question. *We are especially concerned with methods employed in stripping precious metal before enameling. We have been enameling gold for many years and have always stripped our rings after enameling so that we would not have to perform the stripping operation twice. The disadvantage of this method is that porosity of the cast is often undisclosed until after enameling. Can you offer us some information on this process?*

M. F.

Answer. In order to enamel precious metal successfully, the metal must be very clean before the enamel is applied. It is good practice to pickle the metal in 10 per cent sulfuric acid, after which scratch brushes made either of soft brass wire, or more specifically, 11-900 Felton wheels, are used with water to clean the metal surface completely. This operation is followed by a dip in hot water after which the parts are dried by tumbling in Maizo

(ground-up corn cobs). After the parts are dry, they should be kept covered so that no finger marks or oxidation of any sort will form. The enamel can then be sifted in and fired, after which the same pickling and cleaning process must be completed. If more than one color is used, the process must be repeated for each color.

Of course, the parts should be allowed to cool to room temperature before pickling after enameling. Otherwise, cracks in the enamel may form as a result of the drastic change in temperature.

——— fc ———

Question.—*We are interested in obtaining some method of measuring oil films on metal surfaces formed through the use of various mineral, animal, or vegetable oil combinations. Are any of the methods referred to in the January issue of* PRODUCTS FINISHING *applicable to the determination of oil films on metal surfaces, particularly aluminum?* *F.J.E.*

Answer. The Interchemical Wet Film Thickness Gage described in the article to which you refer would seem to be a measuring device which could be adapted for the purpose you have in mind. This testing device can be used as long as the surface to which the wet coating is applied is uniform. The surface should be flat or may be curved slightly as long as the curvature is uniform.

——— fc ———

Question. *We are manufacturers of plumbing brass trim and are interested in a method of obtaining a bright gilded finish on our rough sand castings before they are polished and plated. We would appreciate any information you might be able to furnish.* *J.P.*

Answer. Bright dips for copper and brass are usually mixtures of sulfuric acid and nitric acid in varying percentages. A typical formula will consist of:

sulfuric acid	2 gal.
nitric acid	1 gal.
water	1 qt.
hydrochloric acid	½ fl. oz.
room temperature	

The hydrochloric acid is added to increase the luster but an excess will tend to cause spotty surfaces. Wood soot and activated carbon are often added, especially when excessive amounts of hydrochloric acid are present, and tends to improve the operation of the dip. Sodium chloride may be used in place of hydrochloric acid in the formula.

If the work is coated with scale, treatment in a pickling solution or "scaling" dip is advisable before bright dipping. After bright dipping and rinsing thoroughly in cold running water, articles may be dipped in a solution of 4 oz./gal. sodium cyanide to remove stains and, after an additional cold rinse, in a hot water rinse containing from ⅛ oz./gal. of soap, if the articles are to be lacquered, to 1 oz./gal. if no further treatment is required.

Tanks should be water jacketed to keep the temperature of the bright dip from rising and may be made of stoneware, 18-8 stainless steel, and metal coated with suitable organic materials. Dipping baskets may be of stoneware, aluminum, 18-8 stainless steel, or Nichrome, preferably the latter two, since aluminum is attacked by alkaline cleaners and stoneware is rather sensitive to the thermal shock involved in rinsing after cleaning.

Where a semi-bright finish is satisfactory, the following dichromate dip will be satisfactory. Lead or lead lined equipment is used.

sulfuric acid	12 oz./gal.
sodium dichromate	4 oz./gal.
room or elevated temperature	

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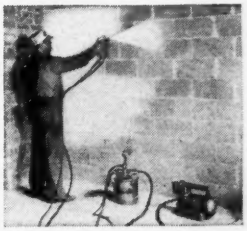

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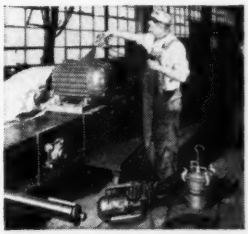

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for Bulletin No. 600 which fully illustrates and describes this unit.

Surface Finishing and Protection of Magnesium Alloys

By H. K. DeLONG
The Dow Chemical Company, Midland, Michigan

As the use of magnesium expands from the aircraft field to many new consumer applications, there is increasing interest in methods for effective and economical finishing of these new products. Not only must the protective coatings provide adequate protection, but they must be competitive costwise with finishing practices for other metals. The finishing of magnesium has been the subject of much study and investigation in the search for a means of improving the corrosion resistance and wear resistance, as well as to obtain and maintain a pleasing surface appearance. The methods used in the finishing of magnesium, except for details of operation, are basically the same as those required for most other metals. These include surface conversion coatings by chemical dipping and anodic oxidation, painting, and, recently, electroplating.

Chemical Treatment

Many methods of protecting magnesium alloys by chemical treatment have been developed and are described in the literature as a means of improving the corrosion resistance, adhesion of subsequent paint coatings, surface appearance and wear resistance. Some chemical treatments may provide the metal surface with only one of these qualities while others may afford a combination of two or more of these characteristics. Protection against corrosion and paint base qualities may be considered the most important. Generally speaking, a chemical treatment that protects the metal from corrosive influences will offer at least some improvement in paint adhesion. Wear resistance and decorative effect may be achieved by some treatment methods. The demand for these latter treatments is somewhat limited. In cases where painting is not permissible, or the chemical treatment is followed by clear lacquering or waxing, a pleasing decorative effect with appreciable wear resistance and protection may be attained.

It is not possible to mention in detail all the various methods of chemical treatment and anodizing that have been developed or used commercially in the past. Those that are being used at present and have proved to be, in

A paper presented at the Fifth Annual Meeting of the Magnesium Association, April 20, 1949.

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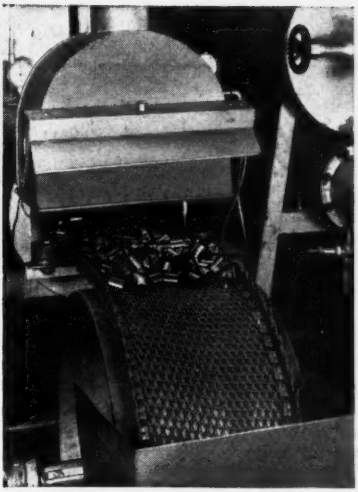

Metal stampings emerge from annealing furnace on a Cambridge Guard-Edge Belt—a belt characterized by high tensile strength, low thermal capacity, resistance to high temperatures, extreme open mesh.

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TABLE I

Common Name	Trade Designation: Army Navy Specification	American Magnesium Company	The Dow Chemical Company	Dimensional Change	Rating of Protective Value (A=Best)	Abrasion Resistance (Haueisen Values)
Chrome-Pickle	AN-M-12a Type I	AMC-A	No. 1	0.0006"/ surface	C	1
Sealed Chrome-Pickle	AN-M-12a Type II	AMC-L	No. 10	0.0006"/ surface	A	4
Dichromate	AN-M-12a Type III	AMC-G	No. 7	Negligible	A	8
Alkaline Dichromate	AN-M-12a Type III	AMC-H	No. 8	Negligible	A	13
Galvanic Anodizing Treatment	AN-M-12a Type IV	AMC-K	No. 9	Negligible	A	10
Bright Chromic Acid Pickle	.....	.....	.....	0.0003"-0.001"/ surface	B	1
Caustic Anodize	.....	AMC-R	No. 12	Negligible	A	25-35
Borate-Silicate Anodize	.....	.....	No. 14	Negligible	A	42

general, most satisfactory from the various considerations previously mentioned are to be discussed. These treatments are shown in Table I.

The values shown for the protective value are relative. The protective values were determined by accelerated tests in salt spray, salt water intermittent immersion, and in the atmosphere of interior and exterior exposures. Those treatments given a rating of "A" were most suitable in accelerated tests in salt water and salt spray, while in the atmospheric tests much smaller differences were noted between the various ones shown. It was also noted in accelerated testing that as the inherent corrosion rates of the particular alloy decreased, the differences between the various treatments were less pronounced. The abrasion tests represent values obtained on a standard method of abrasion testing in which 200 mesh aloxite is impinged by an air pressure on a standard sized area of the coating. The values shown represent grains of abrasive required to penetrate the coating at 12 oz./sq. in. air pressure.

The selection of a chemical treatment will be dependent on the particular corrosion environment to which the magnesium alloy application is to be subjected as well as other factors such as close dimensional tolerance requirements. None of the treatments shown are sufficiently protective for exterior applications without the subsequent application of durable paint coatings. For interior uses they should preferably be lacquered or waxed to provide the necessary protection, particularly if the humidity is high or if the air contains corrosive gases.

The procedures for those treatments shown in Table I approved by the Army and Navy are conveyed in detail in Specification AN-M-12A, as well as in various process manuals for magnesium alloys and will not be discussed further. However, those treatments not shown in this specification

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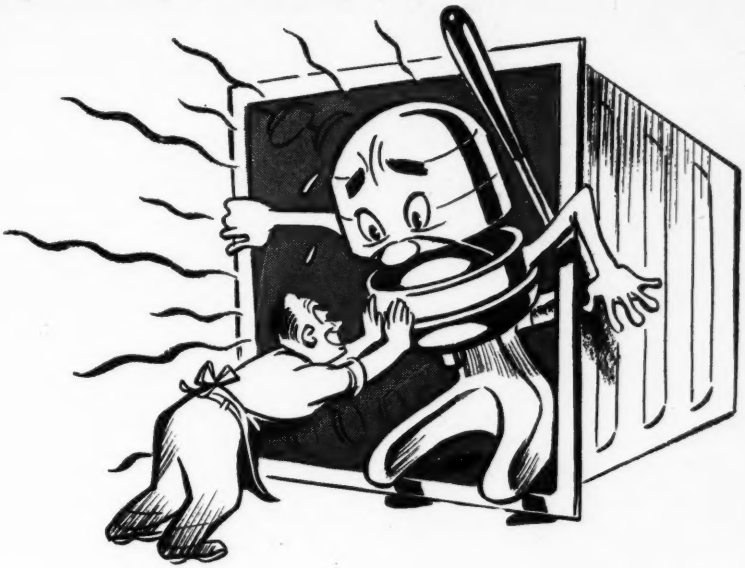

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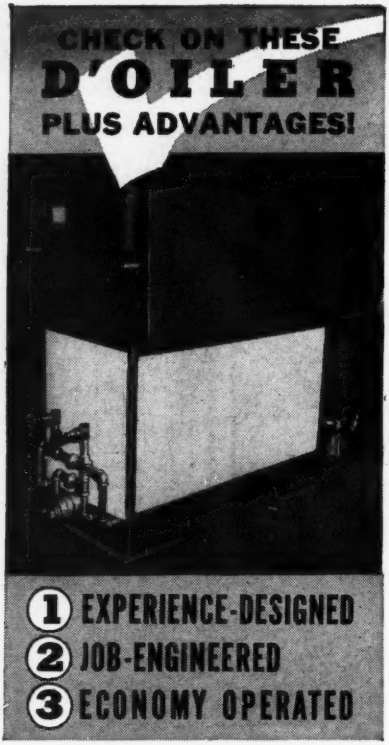

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have been used to some extent in recent years and will be explained somewhat in detail.

Bright Chromic Acid Pickle

This process is quite similar to the Chrome-Pickle treatment in many respects. The bath composition differs in that the nitric acid to chromic acid ratio is much lower and fluoride is added to produce a brightening effect by inhibiting the normal preferential etching tendency, thus producing a smooth metallic appearing surface of high luster. Two types of baths have been used in applying this treatment; namely, (1) Dilute Chromic Acid Pickle, and (2) Concentrated Chromic Acid Pickle. These baths are made up as follows:

(1) 180 gm./l. chromium trioxide.
30 gm./l. sodium nitrate.
2.5 gm./l. magnesium fluoride.
Treatment Time 30 sec., 3 min.
Temperature 70-90 deg. F.

(2) 280 gm./l. chromium trioxide.
25 c.c./l. con. nitric acid.
8 c.c./l. hydrofluoric acid.
Treatment Time 30 sec., 2 min.
Temperature 70-90 deg. F.

Either of these solutions may be used for all forms and alloy compositions. However, the dilute bath is more satisfactory for lower aluminum content sheet and extrusion alloys, while the more concentrated bath is more satisfactory for use with higher aluminum content casting alloys. It is preferable to precede the dilute treatment by pickling in 7-10 per cent nitric acid to shorten the bright pickling time, thus prolonging the solution life. Rinsing in cold water after pickling must be done hurriedly to avoid staining. A hot water rinse, or a dip in 5-10 per cent hot (160-212 deg. F.) sodium hydroxide followed by cold and hot water rinsing, will remove the stain. Staining, in the form of dark brown colored streaks, is due to a partial de-

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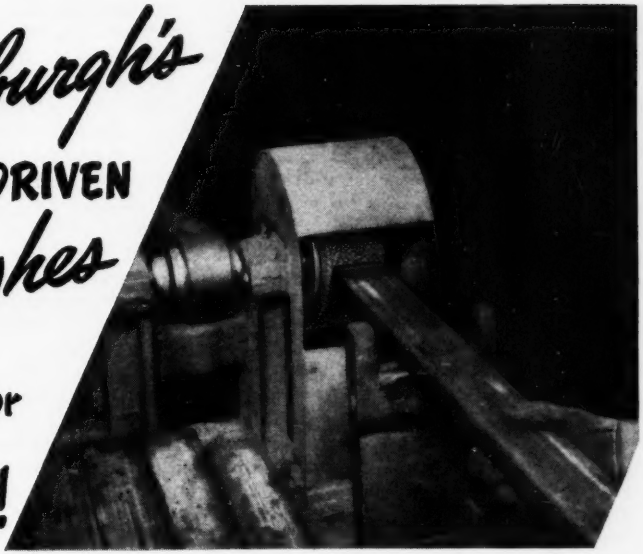

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pletion and drying of the treatment solution while the parts are in the air before rinsing. Bright Pickle coatings should be followed by clear lacquering or waxing to preserve the surface appearance, although on interior applications this treatment has offered considerable tarnish resistance in itself.

Caustic Anodize

Magnesium alloys can be coated with a dense hard coating by anodic oxidation in aqueous alkaline hydroxide solutions. Several processes by which coatings of this type can be produced have been advanced. The coating is essentially magnesium hydroxide formed in a very compact manner. Straight sodium hydroxide may be used as the electrolyte; however, the addition of certain organic compounds such as phenol, sodium oxalate, ethylene glycol, and so on, tend to act as depolarizers permitting the formation of harder and more dense coatings.

A typical example of the electrolyte used to form these coatings is as follows (Dow. No. 12 Anodic Process):

240 gm./l. caustic soda.
70 c.c./l. ethylene glycol.
2.5 gm./l. sodium oxalate.
Temperature 165-175 deg. F.
Current Density 10-20 amp./sq. ft.
Voltage 4-6 (d.c. or a.c.).
Time 15-25 min.

Coatings of this type, no matter how thoroughly rinsed, may still retain some free alkali in the pores. It is necessary to subject the coated surfaces to a neutralizing treatment if subsequent paint coatings are to be applied in order to obtain satisfactory paint adhesion. Mildly acid solutions containing a chromate have proved to be quite satisfactory for this purpose since chromate is also absorbed into the coating and results in improved corrosion resistance. A particularly satisfactory solution contains 5 per cent sodium acid fluoride and 5 per

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cent sodium dichromate. Coatings of this type are suitable for interior applications if waxed or clear lacquered. These treatments, like all the other treatments shown, required standard coatings of primer and lacquer or enamel finish coats for satisfactory protection in applications involving exterior exposure. These anodic coatings can be colored by dyeing, using organic dyes similar to those used in the coloring of anodic coatings on aluminum. After applying the anodic coating to magnesium alloys, a pre-dip in dilute ammonium hydroxide or aluminum acetate is usually required to condition the coating prior to dyeing. The dye colored coatings are then protected by waxing or clear lacquering.

Borate-Silicate Anodic Treatment (Dow No. 14)

This treatment provides a coating of good stability in ordinary environments and, in general, offers protection equal, or slightly superior, to the treatments previously mentioned. This treatment is somewhat more abrasion resistant than the hydroxide type of coating formed by anodizing in caustic soda solutions. Other advantages of the coating are its lower degree of sensitivity to surface conditions of the metal prior to coating and its ability to remove or conceal surface defects on die castings.

The coating is applied using alternating current starting with a low initial voltage and gradually increasing the voltage to a final value of 110-120 volts. The work is suspended on both electrodes of the alternating current source and the coatings are formed during the current cycle when the magnesium surface is functioning as the anode. The details of bath composition and operation are as follows:

Sodium metaborate, 2 lb.
Sodium metasilicate, 9 oz.
Sodium phenate, 1⅓ oz.
Water, to make 1 gallon.
Temperature, 70-90 deg. F.
Current Density, 10-15 amp./sq. ft.
Votage, 0 to 110-120 (depending on alloy composition).
Time, 5-20 minutes (depending on current density and alloy composition).

The coating formed by this process is white to light gray in color. It must be followed by waxing or clear lacquering to avoid smudging with dirt in handling and to improve the protection when used in interior applications. The coating can be neutralized and sealed with the fluoride-chromate bath mentioned for use with hydroxide type anodic coatings. It is then a suitable base for priming and painting and can be used in exterior applications, or in more corrosive environments.

Painting

The type of paint protection required for magnesium alloys is primarily dependent on the service conditions to

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be encountered and the length of serviceability expected of the particular application. Service conditions fall into three general classifications: (1) Normal interior exposure—corrosive fumes, vapors and high humidity conditions are not present; (2) Exterior exposure—inland atmospheric conditions where average conditions of rainfall, humidity and corrosive vapors are encountered; (3) Marine atmospheres—salt spray, corrosive vapors, or fumes, and intermittent immersion in inland waters.

Primers

Paint systems satisfactory for use in each of the foregoing conditions of service will vary in type and number of coats depending upon the severity of exposure. In all cases it is desirable to apply a suitable chemical, or anodic treatment, to secure adequate adhesion of paint coatings.

Normally, it is necessary to use specific primers to secure satisfactory adhesion even to chemically treated surfaces, particularly when air drying systems are used involving lacquer finish coatings. A satisfactory primer of this type is covered by Army-Navy Specifications AN-P-656. This primer and its previous modifications have been used almost exclusively in aircraft applications during the past several years. Good paint protection has been obtained with it, but when used on magnesium it has been somewhat difficult to secure adequate adhesion to the metal surface. If it is applied in a very thin coat (0.0003 in.) and the surface has been given a high quality chemical treatment, good adhesion can be obtained. The paint systems that have been developed to meet the previously mentioned three classifications of exposure when applied over a chemical treatment may be divided into

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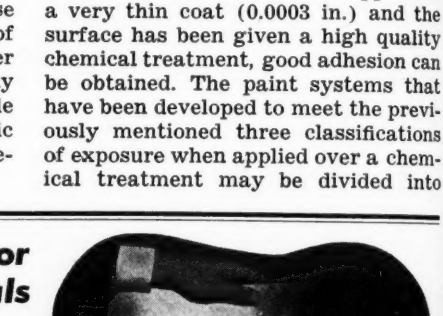

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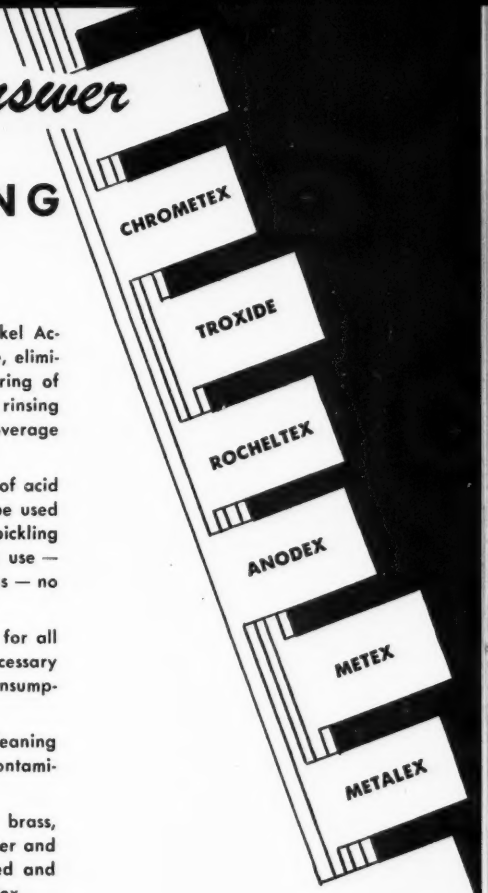

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two general types according to the primer used. For interior and inland exterior conditions, good adhesion of the primer to the metal is the chief consideration. In severe service conditions such as marine atmospheres, intermittent immersion in water, corrosive fumes, etc., the primer should contain zinc chromate as the principal ingredient. However, in some cases such as in inland waters, titanium dioxide has proved more satisfactory because of the blistering tendencies of zinc chromate primers in this particular environment. Primers for magnesium should not contain iron oxide, white lead, or red lead, since these compounds tend to increase corrosion.

Sometimes it is difficult to predict the severity of service conditions under which an application involving the use of magnesium will be used. In such cases, it is always best to employ primers inhibited with zinc chromate. Baking of the primer or initial paint coating will materially improve the paint adhesion and protective value.

Finish Coats

The type and number of finish coats also depend on the severity of exposure in service conditions. In general, one or two coats of air drying lacquer or enamel is sufficient for normal indoor exposure. For exterior inland exposure it is preferable to apply an inhibitive type primer followed by two or three coats of finish if lacquers are to be used. Usually two coats of enamel of the glycerol-phthalate or phenolic type paints are sufficient. Ordinarily enamels do not require an inhibitive type primer for this type of exposure. Here again, however, a primer should be used to secure maximum adhesion. In seacoast or other corrosive atmospheres, three, and preferably four coats of paint including one or two coats of zinc chromate primer are required. Finish coats of synthetic resin enamels based on

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phenolic or oil modified phenolic resin varnishes are preferable. The primer should be of the type meeting Army-Navy Specifications AN-P-656, or the equivalent. Baking type alkyds, or modified alkyds, may be satisfactory. When severe corrosive environments are anticipated, painted magnesium and specific paint systems should be tested in the particular application or in accelerated tests simulating the conditions, in order to ascertain the feasibility of its use as well as whether paint will provide the necessary protection. Baking of the finish coats improves their resistance to moisture and is preferred for applications of this nature.

Electroplating

A process has been developed for electroplating on magnesium which at this time appears commercially feasible and is being used to some extent in the production processing of castings and wrought parts. With this process any of the metals that are capable of being electrodeposited can be applied. Through the use of this process to apply more noble and harder metallic deposits, improved tarnish resistance, corrosion protection, and wear resistance can be obtained.

In general, the process consists in the initial deposition of an immersion zinc coating followed by copper striking in a slightly modified copper cyanide bath and electropating in standard plating baths. Once the copper is applied in thicknesses of about 0.0005 in., nickel can be applied, followed by chromium plating as in the application of decorative chromium plating on other metals. Heavy copper, silver, cadmium, zinc, gold, brass, and so on, can also be applied. The zinc immersion coating is applied by the following aqueous solution and operating conditions, after proper degreasing and pickling:

120 gm./l. tetrasodium pyrophosphate.
40 gm./l. zinc sulfate.
10 gm./l. potassium fluoride.
5 gm./l. potassium carbonate.
Treatment Time 3-5 min.
Temperature 175-185 deg. F.
pH, 10.0-10.4.
Agitation, very mild mechanical agitation to avoid stratification of solution.

Unalloyed, or pure magnesium requires a lower fluoride concentration. In this case 2.5 gm./l. potassium fluoride are sufficient.

Conventional methods of applying the deposits by racking are possible. Organic rack coatings must be used to confine the exposed rack area of dissimilar metal to a minimum for electrical contact to avoid blistering of the deposits locally around the contact area. This is good practice for plating in general. Recent pilot plant tests have proved that small parts can be readily batch processed by standard

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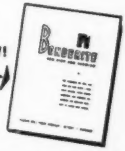

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barrel methods, such as used with other metals. Copper, copper-nickel and black nickel deposits have been applied in a conventional plating barrel. Bright barrel plated nickel, followed by rack chromium plating is possible without the necessity for buffing the nickel first. Barrel plating provides an economical method of finishing small parts, such as screw machine products and the like, which would be difficult and costly to plate by rack methods.

The stability and protective value of various electrodeposits on magnesium alloys have been investigated. In general, deposits obtained by this process provide excellent protection. Tests in various corrosive environments such as salt spray, high humidity, interior exposure and exterior exposure have been completed or are in progress at this time. Chromium plated die cast parts, such as file cabinet handles, have been exposed in a laboratory atmosphere for over two years with no indication of corrosion or blistering. In some cases these parts were plated with as little as 0.0005 in. of nickel. Silver and chromium plated parts have withstood 90 days in high humidity at 95 deg. F. and 85-95 per cent relative humidity. No indication of blistering or corroded areas has been noted.

Copper-nickel-chromium deposits have withstood 48 to 168 hours in 20 per cent salt spray before initial failure depending, of course, on the thickness of the deposits. For equal plate thicknesses the A.S.T.M. requirement on chromium plated zinc and steel is 48 to 96 hours without appreciable corrosion.

No failure has occurred on chromium plated parts in rural exterior exposure tests after six months' exposure. In this test the nickel thickness was also varied from 0.0005 in. to 0.0015 inch. After one year, only the

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thinner deposits have shown corrosion in the form of small pits in a few isolated areas.

It is interesting to note in tests such as salt spray and atmospheric exposure, that when failure starts as a localized area, the corrosion does not spread rapidly between the electrodeposit and the magnesium surface. General lifting of the plate has been noted in other plating processes for magnesium, where inferior adhesion of the plated metal was experienced, or a zinc layer adjacent to the surface was not used.

The adhesion of the electrodeposits appears to be very good. Plated wrought products have withstood heating to the melting point of the magnesium alloy (1100-1200 deg. F.) without a general lifting of or blistering of the deposits. Cast parts will withstand heating to 450 deg. F. and higher, depending upon the quality of the casting. Copper, zinc and silver plated surfaces can be readily joined by soft soldering without disrupting the adhesion. Various electrodeposits will withstand hammering and bending without adhesion failure.

This new process should open up a field for the use of magnesium in many new applications where a bright tarnish resistant surface is essential, or wear resistance is a requirement. The success of the process is dependent almost entirely upon the adherence and uniformity of the zinc immersion coating. Careful operation of the zinc bath, as well as assurance that surfaces to be plated are clean and reasonably free of metallurgical defects, will result in electrodeposits with excellent adhesion and appearance.

The ceramic coatings developed to provide this protection to molybdenum are applied in the form of water suspensions or "slips" to cleaned specimens of molybdenum by either dipping or spraying. After drying, the pieces are fired at a temperature of 2,150 deg. F. in oxygen-bearing atmospheres. The furnace is the only special equipment needed.

An immediate application of these ceramic coatings is the protection of molybdenum Pitot tubes which are built into the nozzle end of ram-jet engines used for pilotless aircraft. These tubes, which are subjected to a gas temperature of about 3,000 deg. F., are expendable and need not last over 5 minutes. A simulated service test of a ceramic coated tube indicated a life in excess of 45 minutes.

The need remains for coatings which will have greater durability and which can, therefore, be used for high temperature applications where longer service life is required. However, in addition to Pitot tubes, other examples of equipment in which even short-time protection can be valuable include coated thermocouples and resistance thermometers made of high melting point metals.

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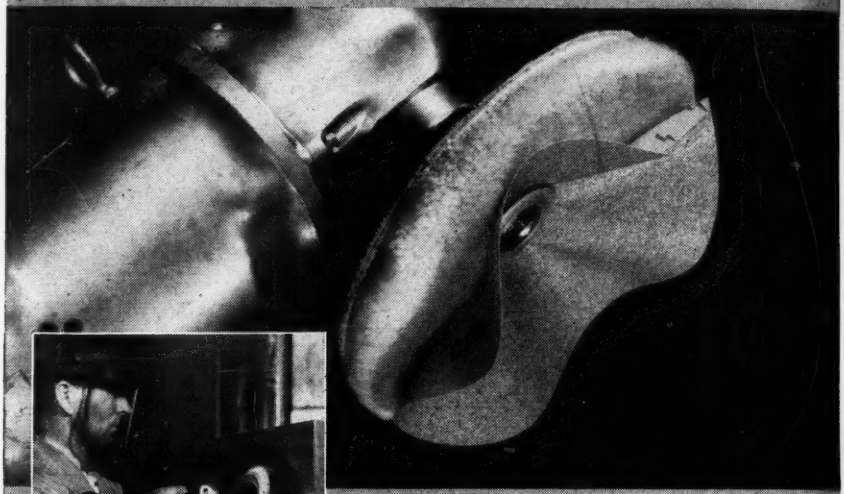

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Spotlight

FINISHING Progress

Recent Developments In Plating On Plastics

WHAT are the valuable properties that metal coatings give to plastics that the plastics would not have otherwise? Considered from the practical side the finished object has acquired, by virtue of the coating, a proportion of the physical characteristics of a metal product yet retaining the light weight of plastics and the economics of forming into complicated shapes. From the decorative point of view, plated plastics combine the brilliant color, which can be achieved with synthetic resins, together with the gleam of metal giving promise of products with utmost in eye-appeal.

Paralleling the progress that has been made in the plastics industry during the past decade has been the development of more efficient and economical methods for the electrodeposition of metallic coatings on these materials. As a result, the combination of metals with plastics by electroplating points the way to new and important uses for plastics in a variety of applications. One method for plating on plastics, which employs reduced copper films, was described before the 35th Annual Convention of the American Electroplaters' Society by Harold Narcus, Electrochemical Industries, Inc., Leominster, Mass. The method known commercially as the "Cupron Process," was described by Narcus as being applicable to large scale pro-

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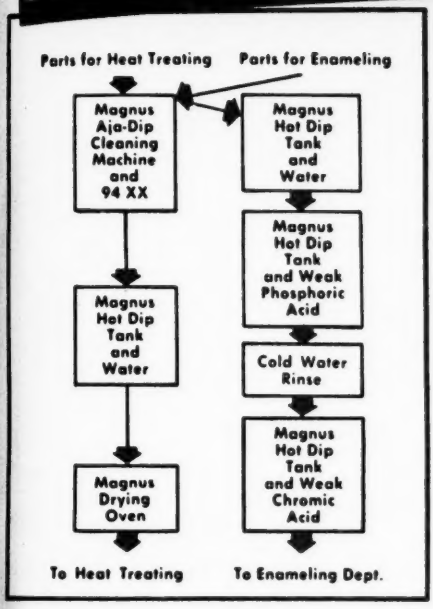
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Elements of metal toys, wrenches, shears, hammers, etc.

Dirts Removed

Removing oil and drawing compounds. Some parts are enamelled after cleaning. Others have to be heat treated.

Former Method

Vapor degreasing. It was necessary to hand wipe parts that had to be enamelled.

MAGNUS Method

See flow chart.

Comparison

Parts are cleaner than with former method. Costs are 50% under former method, due to faster cleaning and elimination of all hand work. Production is 10 times that of former method. User in his report stresses elimination of toxic fumes.

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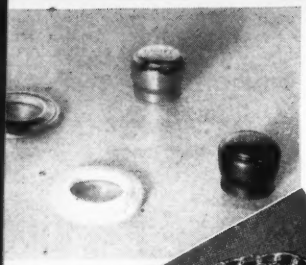

Fig. 1—Light button and escutcheon plate cellulose acetate parts finished in copper - nickel - chromium showing the before and after finish *(Photo courtesy Electrochemical Industries, Inc.)*

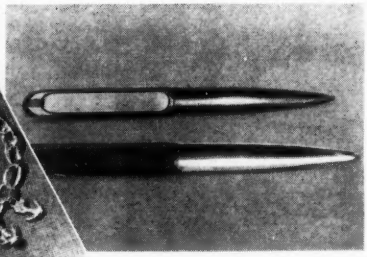

Fig. 2 — A two-tone finish effect is obtained by plating only the blade of a phenol - formaldehyde letter opener. *(Photo courtesy Electrochemical Industries, Inc.)*

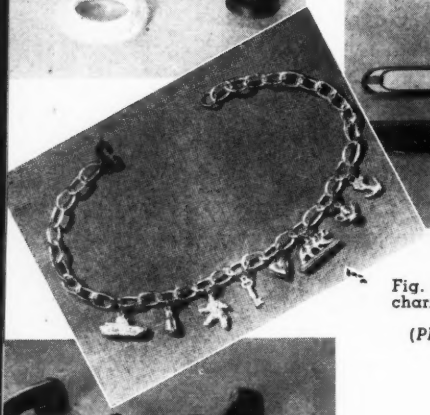

Fig. 3—Cellulose acetate chain and charms plated with a final finish of gold *(Photo courtesy Electrochemical Industries, Inc.)*

Fig. 4—The application of copper-nickel-chromium finish to cellulose acetate automotive parts showing the before and after finish on door and window handles *(Photo courtesy Electrochemical Industries, Inc.)*

duction operations in plating many types of plastic parts.

Figures 1 and 4 illustrate the application of a copper-nickel-chromium finish to cellulose acetate automotive parts, showing the before and after finishes on door and window handles, light button and escutcheon plate.

Figure 2 illustrates a two-tone effect obtained by plating only the blade of a phenol-formaldehyde letter opener. Figure 3 shows the application of the process for plating a cellulose chain and charms with gold.

The copper reduction process for plating on plastics, according to the process developed by Narcus, involves the following production cycle presented in stepwise sequence:

Step A—Roughening or "de-glazing" the plastic surface.

Step B—Cleaning the surface.

Step C—Sensitizing the surface.

Step D—Activating or "seeding" the surface.

Step E—Formation of the reduced copper film.

Step F—Electrodeposition of an intermediate layer of copper or silver.

Step G—Application of the final or outer deposit of the desired metal.

Step A—Roughening or "De-Glazing" The Plastic Surface

This operation is carried out for several purposes, each affecting the final result. The degree of roughening not only determines the strength of adhesion of the metal to the plastics, but also serves to remove the "flash" or feather-edge commonly accompanying the molding of a plastic part. The oper-

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ation may be carried out either mechanically or chemically. According to Narcus, the former method is preferred because chemical etchants for the plastic surface do not remove the "flash," and also require extreme care in use, so as not to cause too severe an etching action.

The preferred mechanical depolishing procedure is generally accomplished by wet-tumbling the plastic parts in a mixture of 100-110 mesh pumice and water for several hours, depending upon the shape, size, and condition of the surface, or by blasting with 220 grain aluminum oxide. Concerning the influence of roughness on adhesion of the plate to plastic parts, Narcus emphasized the fact that tests have been conducted which show that the rougher the plastic surface the greater the adhesion of the composite metal to the surface. The degree of roughness is only limited by the required smoothness of the final plated part. In other words, the maximum roughness is that which will give a smooth outer surface deposit by tumbling in burnishing barrels or hand polishing. Extreme or exaggerated roughness will necessitate increased finishing operations which are objectionable. Microscopic cavities are produced in the plastic surface through reasonable roughening; the cavities become coated with the conductive film which, in turn, is plated, the net result being a strong interlocking action.

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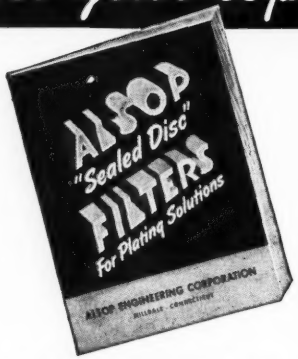

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Step B—Cleaning the Surface

It is important that the surface of the plastic be freed from any greasy or oily films, or any other surface contaminants present after the roughening or "de-glazing" operations. As pointed out by Narcus, the cleaners employed need not be strongly alkaline; proprietory cleaners such as commonly used for soak cleaning of nonferrous metals were stated to give satisfactory results. The cleaners are used at temperatures in the range 90-110 deg. F.; higher temperatures may cause distortion of the plastic parts, especially the thermoplastic type.

Step C—Sensitizing the Surface

It is important that the sensitizing treatment be carried out immediately following the cleaning of the plastic part, without allowing the part to dry. This treatment consists in immersing the plastic part in a concentrated solution of titanous chloride, which according to Narcus, is prepared in commercial form by electrolysis of titanium tetrachloride. The specific composition of the solution recommended by Narcus is as follows:

50 ml. conc. sol. titanous chloride.
50 ml. HCl (C. P.—Conc.).
1000 ml. water.

The sensitizing solution is violet in color, when initially made up; however, after use a green color results, indicating that the solution has lost

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its effectiveness as a reducing agent and should be discarded. One point brought out by Narcus was that the life of the solution could be increased considerably by periodically immersing a bar of clean tin into the solution. The plastic part, after treatment, is thoroughly rinsed in running water. The purpose of this step appears to be similar to that of pretreatment with stannous chloride-hydrochloric acid solution in silvering processes. According to Narcus, omission of this step in the cycle will result in a spongy, non-adherent type of copper film with poor electrical conductivity.

Step D—Activating or "Seeding" the Surface

The activating or "seeding" treatment, according to the plating procedure, is carried out by immersing the plastic part, after its "sensitization," in a dilute solution of chloroplatinic acid made up of 1 gram of chloroplatinic acid per gallon of distilled water. A treatment time of 5-10 minutes is used depending on the intricacy of the part. The mechanism was described as being that of formation of a thin film of platinum on the plastic surface, due to the reducing action of the titanium salt, which accelerates the formation of metallic copper.

Step E—Formation of Reduced Copper Film

The following solution was recommended for formation of the reduced copper film on the surface of the plastic part:

Coppering Solution—(Fehling's Solution).

Copper sulfate (U. S. P.) -- 35 g./l.
Rochelle Salt (tech.) ----- 175 g./l.
Sodium hydroxide (C. P.) -- 52 g./l.

In carrying out the copper film formation operation, the above solution is mixed with an equal portion of a reducer solution made up of a 20 per

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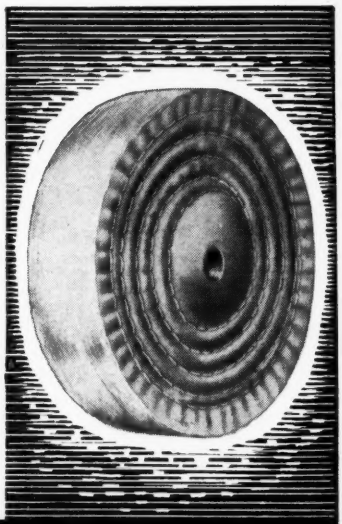

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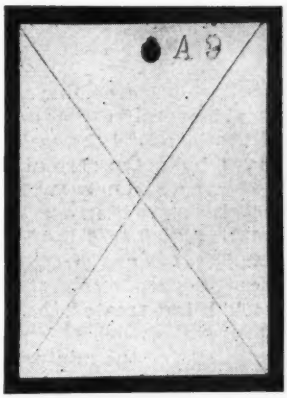

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Table I

The Thickness of Copper Films Produced by Coppering Operation as Compared with Silvering as a Function of Time of Treatment

TIME (minutes)	THICKNESS OF COPPER DEPOSIT (inches)	THICKNESS OF SILVER DEPOSIT (inches)
1.0	0.0000000"	0.0000015"
2.0	0.0000002"	0.0000016"
3.0	0.0000006"	0.0000034"
4.0	0.0000007"	0.0000036"
5.0	0.0000010"	0.0000048"
10.0	0.0000039"	0.0000053"
20.0	0.0000063"	0.0000073"
30.0	0.0000107"	0.0000075"
40.0	0.0000112"	0.0000075"

cent (by wt.) solution of zinc sulfoxalate formaldehyde. In the case of plastic parts which lend themselves to processing in bulk, the formation of the reduced copper film is performed in inclined or horizontal glass containers rotating at 5 to 6 revolutions per minute. The amount of coppering solution needed depends upon the area of the work being treated. Approximately one quart of each of the solutions (two quarts of the mixture) per square foot of work area was stated to be satisfactory.

According to Narcus, the copper bonding operation is complete after 30-45 minutes have elapsed, during which time the treatment solution turns from deep blue to a blue-green color. Given in Table I above is the thickness of the copper film produced as a function of the time of treatment, and also compared with a silvering process for plating on plastics. One type of commercial silvering process for plating on plastics, known as the Metaplast process, will be described in a subsequent section.

Step F—Plating of the Intermediate Layer of Metal

After formation of the copper film on the plastic surface, followed by thorough rinsing and drying, the parts are copper or silver plated. According to Narcus, copper is generally preferred from the commercial standpoint because of the economics involved. A thickness of 0.003 in. is generally deposited from an acid type copper electrolyte. The usual procedure is to flash the plastic parts in a dilute, low free acid bath made up of 40-100 g./l. copper sulfate and 2.5 g./l. sulfuric acid, and then build up to the desired thickness of copper in a conventional bath having an approximate composition of 200-300 g./l. copper sulfate plus 15-40 g./l. sulfuric acid.

Step G—Application of the Final Outer Deposit of the Desired Metal

The outer layer of the desired metal is applied after the acid copper plate, applied in the preceding step, is bright-dipped, tumbled, or hand polished to the desired luster.

Conductive Silver Films on Plastic Parts

A patented process, known as the Metaplast Process, for production of silver films on plastic surfaces by chemical reduction is the basis of another commercial method for plating on plastics. In this process the plastic is sensitized with a solution consisting largely of stannous chloride, and then is silvered with ammoniacal silver nitrate solution mixed with a reducing solution. Small objects are handled in quantity by immersion in the silvering solution.

The conductivity of the applied films is important for the subsequent elec-

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troplating step. The suitability of a conductive coat for electroplating may be tested with an ohmmeter, and in general, the film forming process can be used several tmes to give second or third coats of conductive material if the specimen is found not sufficiently conductive. If it is not desired to coat some surfaces, stop-off methods using masking tape or a stencil with stripping lacquers may be employed.

The electroplating process following the reduced silver film process employs standard practice with only minor variations. Since the conductive coat is generally thin, regardless of how it is applied to the plastic surface it is usually not advisable to use a high current density on a large piece unless a number of contacts are made for the distribution of the current. In the silvering process also, proper preparation of the plastic surface to receive the metal coating is important. The most commonly used method for surface preparation prior to silvering, to improve adhesion of the final plated plastic, is to roughen (depolish) or swell the surface. Other commercial methods used for surface preparation include dry blasting and wet tumbling, adjusting the type and size of grit to the particular plastic and the type and thickness of metal.

A conducting silver film can be applied to plastic parts using a conducting silver paint. It has been reported that the conductivity of silver paint coatings is considerably improved by burnishing with a dry lintless cloth, to which has been attributed the removal of surface binder and improved particle contact.

Metal Spraying and Vacuum Deposition

Metal spraying of plastics sometimes finds use in special applications requiring thick films of metal which are machined or ground to proper dimensions and required surface finish. The melting point of the metal used with relation to the type of plastic surface is an important consideration, particularly in the initial coat. Metal evaporation and cathode sputtering are relatively expensive and are used only in special cases, generally in those applications requiring exact duplication of the underlying surfaces. Both methods involve the use of vacuum chambers to house the plastic while carrying out the operation. The surface of the plastic must be cleaned carefully for good and uniform adhesion. It has been reported that these methods have been used for the production of a film of a metal which cannot be applied by other methods, for example a film of aluminum.

Corrosion Resistance

The corrosion resistance of metals plated on plastics is, as would be expected, generally superior to that of the same metal plated on a metallic

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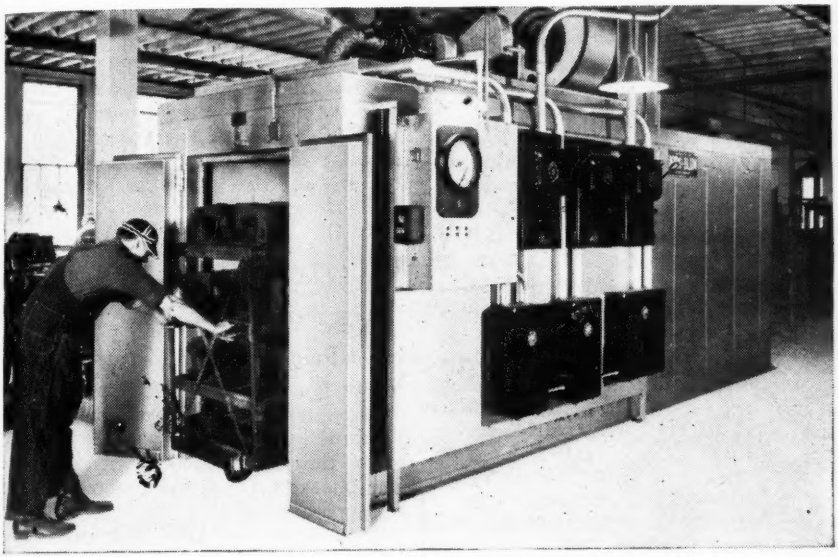

This manufacturer uses two KIRK & BLUM electrically heated, automatically controlled ovens to bake wrinkle finishes on sewing machine parts. In operation, a loaded truck is pushed into the ovens every twelve minutes (automatically timed); when the fifth truck enters, the first is removed at the other end, allowing a total time of 48 minutes in the 20-foot long tunnel. As shown above, automatic controls, recording thermostat and line switches are compactly mounted on the side of the oven. The two ovens have a capacity of 20 truckloads per 8-hour day.

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base because of the elimination of electrolytic potentials between dissimilar metals. Since the plastic base is inert there can be no electrolytic action resulting in corrosion between the synthetic base and metallic coating. Even if multiple metal coats are used on a plastic, it has been reported that the combination has superior corrosion resistance to the same multiple layers applied to a ferrous metal base.

When designing a plastic object which is to be finished by metal plating, it is well to bear in mind the conditions which may cause failure of the metal-plastic bond, and wherever possible select features of the design which will produce improved adhesion. Obviously, indentations, grooves, reentrant curves will improve adhesion by providing mechanical interlocks. Frequently, such features may be made part of the design for ornamental reasons so that the appearance may be enhanced at the same time the adhesion is improved.

Sharp corners, edges or lines in the plastic are undesirable. It has been found in practice that such edges are difficult to make conductive, and the conductive coat may rub off easily. Furthermore, on such parts the plated metal is easily cut through during polishing, and in some cases the metal may split along these edges in service. Another recommendation that has been made for producing plastic parts that are to be plated is that the molds used be highly polished and chromium plated to produce maximum smoothness on the plastic surface, in order to prevent surface blemishes, which will require additional buffing for the required high surface finish.

* * *

New Vinyl Resin-Phosphate Primer for Aluminum

IT is generally recognized that although paint and varnish films may display extraordinary water resistance, they may permit water vapor and gases to penetrate and reach the face of the metal in sufficient quantity to be damaging. These dissolved gases are one factor that may accelerate the attack of coated metal surfaces, and are one reason why the added pigments in primer coatings play an important role in the corrosion resistance imparted by a coating system. Some of the requisites set forth for a good primer for aluminum by the Aluminum Company of America are: the primer for aluminum surfaces should have good resistance to moisture penetration; it should adhere well to the aluminum surface; it should provide a good base for the second coat; it should contain an inhibitive pigment for the prevention of surface reaction. It is generally recognized that zinc chromate possesses corro-

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sion inhibiting properties and is usually recommended in priming coatings for aluminum surfaces. It is important that primers containing lead pigments not be used on aluminum.

Recently Clyde St. John, Permanente Metals Corporation, has described in "The Iron Age" (January 13, 1949) the method for production of a primed aluminum sheet which requires no further preparation for finish coating applications. However, care must be taken to keep the sheet free from dirt and oil during fabrication. The treatment is stated to provide excellent adhesion for most paints and organic coatings and is effective in resisting corrosion.

Chemically, the primer is described as a formulation of vinyl-butyral resin pigmented with zinc chromate, and thinned with a solution of isopropyl alcohol, butyl alcohol and phosphoric acid. The primer should be used within 8-12 hours after thinning since the reaction of the phosphoric acid with the vinyl-butyral resin causes permanent gelation after that period. The wash primer, which is a wartime development of the Bakelite Corporation, can be applied by spray, brush, dip, swab or roller and dries to a thin tough film. After application and under a recommended heat of 350-400 deg. F., the phosphoric acid and alcohol react to form water which dilutes the remaining acid. The diluted acid reacts with the metal to form aluminum phosphate, giving the metal a light etch and providing an excellent bond for the primer.

Heats of the above intensity need to be attained for only an instant. Less intense temperatures will give satisfactory results if the heating period is extended. In applying the primer, St. John stated that Permanente uses a roller coating method integrated into a continuous process which will handle either flat sheet or coils. It was

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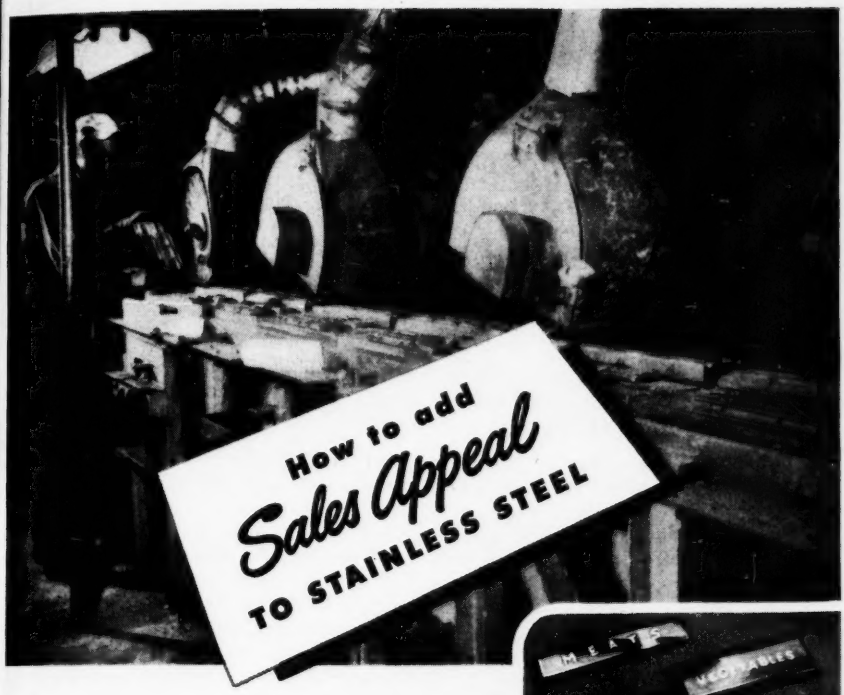


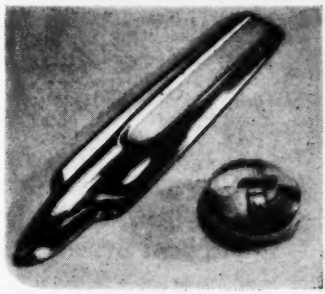
New Osborn Power Driven Buffbrush* speeds production, reduces "rejects" of high finish stainless steel parts produced by The D. L. Auld Co., Columbus, Ohio.

WITH the trend toward extra touches of bright, gleaming trim on cars and home equipment, there is an increasing use of highly finished stainless steel by automotive and appliance manufacturers.

The D. L. Auld Company, Columbus, Ohio, one of America's outstanding producers of polished and plated parts for the automotive and appliance industries, is meeting today's changing market requirements with new product developments and production methods.

Osborn's sensational new power driven Buffbrush*, used with an abrasive compound on an automatic machine, provides the method for producing a superior finish on automobile trim parts and refrigerator trim strips formed from stainless steel. Parts are loaded into holders on an endless belt and carried under rotating heads equipped with Osborn Buffbrushes. A high lustre finish is thus obtained.

If *you* are interested in cutting costs and improving metal finishing operations, write to . . .



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Dept. 161, 5401 Hamilton Avenue *Cleveland 14, Ohio*

*Trademark

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES

reported that the flat coated sheet is not harmed by light drawing, forming or stretch forming, and some alloys can be given 180 deg. bend without damage to the surface. The primed coated sheet was described as requiring no further treatment for final application of coating, and is being used in riveted structures such as truck or bus bodies, and for many building material items, such as signs, cabinets, and other products.

* * *

Drainage System For Plating Room Wastes

A SUGGESTED safety drainage system for the plating room which will provide added protection against high concentration of plating solutions getting into the sewer system was presented before the Third Industrial Waste Conference at Purdue University by C. D. McCormick, McCormick Brothers Company, and is described in the Official Proceedings of that conference. According to McCormick, the suggested procedure should do a great deal to eliminate the unusual complaints against the company which has only occasional difficulty.

In discussing cyanide wastes from plating rooms, McCormick stated that there are at least two classes. These are rinse waters from the regular plating processes, plus the plating baths and sludges that are disposed of when new and fresh plating solutions must be provided. In the daily operation of the plating room there is a continual flow of rinse waters and they contain diluted plating solutions. The quantity of water used in rinsing the plated parts will be a governing factor in the concentration of plating chemicals found in the waste waters. In instances where the concentration of toxic chemicals in rinse water is sufficiently low to allow use of sewer systems without complaint, care must be taken to avoid occasional introduction of wastes of higher concentration, as might result from dumping a plating solution into the sewer system.

There are instances where the plating room personnel may not fully realize the danger of dumping the more concentrated plating baths in the sewer system. The wastes of higher concentration may also result from accidents within the plating room. One practice that was recommended by McCormick is that all plating tanks be constructed without drains in them because any material spent or spoiled is generally too strong to discharge into any sewer system, and will require special means of disposal. One other factor brought out was the requirement for proper maintenance and operation of filtration equipment, since failures may allow quantities of

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Haverhill, Massachusetts

Protecting bearing surface on airplane engine impeller shaft with "SCOTCH" Tape No. 470 before replating.

New, Flexible Plastic Tape
SPEEDS PLATING PREPARATION, CUTS COST

Here's a tough, pressure-sensitive tape that has no equal for quick, economical protection of pieces being electroplated or chemically cleaned.

Extra, plus qualities also fit plastic film "SCOTCH" Tape No. 470 for many other jobs . . . such as insulating exposed pipes or fittings against corrosive fumes and vapors or providing impervious, moisture-vaporproof seals for cans or containers. • Use it where you need a tape that . . .

1. Is unaffected by severe action of acids, alkaline solutions, saline solutions, alcohols, or hydrocarbons.
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5. Comes off easily and cleanly—no after cleanup work required.

Sound like "SCOTCH" Tape No. 470 can help you? Just drop us a line telling us about the job you want it to do. We'll send you a sample to try along with our suggestions for its use. There's no obligation, of course. Write: Minnesota Mining and Manufacturing Company, Dept. PF6, St. Paul 6, Minnesota.

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Tape No. 470

for ELECTROPLATING

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Made in U. S. A. by **MINNESOTA MINING & MFG. CO.** St. Paul 6, Minn.

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toxic plating solutions to get into the sewer system.

A suggested layout for the safety drainage system to prevent unusual concentrations of toxic chemicals from getting into the sewer system, drawn up by McCormick, shows a plating room with two drainage systems, one for the wash and rinse waters from the plating process and the other for the floor. The rinse-water drains should be connected to only those overflows where weak waste-water solutions can be collected. If this is done the only polluting material that can get into the waters in this system is the plating solution carried out of the plating tanks and diluted with the rinse water. Within reasonably close limits the amount of plating solution lost would be about constant. It was pointed out by McCormick that in some instances it is entirely possible that if the concentration of waste from a plant was no higher than that of the constant concentration of rinse water, no further treatment of the waste might be required by the regulatory agencies.

The floor drainage system suggested by McCormick is planned to catch all spills, line breaks, and unavoidable accidents to tanks and equipment. It was suggested that the floor drains lead to a holding tank which has a capacity equal to the two largest plating tanks on the particular drainage system. Special precautions must be taken in disposal of the highly concentrated wastes that may accumulate in the special holding tank.

* * *

Pickle Baths For Monel Metal

A SERIES of pickle baths recommended for use with Monel metal have recently been featured by "Ma-

FOR SAFETY'S SAKE

AR-34 "AIR-RESTER"

TO MEET YOUR STATE'S SAFETY CODE . . .

ARREST THAT DUST!

in your BUFFING and POLISHING operations!

Here's the SELF-CONTAINED CYCLONE EQUIPPED STANDARD "AIR-RESTER" for use wherever abrasive dust is involved. This machine with its material handling fan costs no more than less efficient dust collectors with air handling fans! PROMPT DELIVERY.

CODE EXPLANATIONS

C—Cyclone
F—Flame proof Filtering Pads
DE—Drawer Enclosure
D—Removable Drawer
M—Motor
SF—Suction Fan
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Work Safely! Write today for Bulletin 112.

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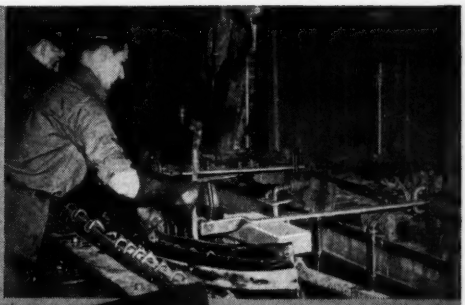
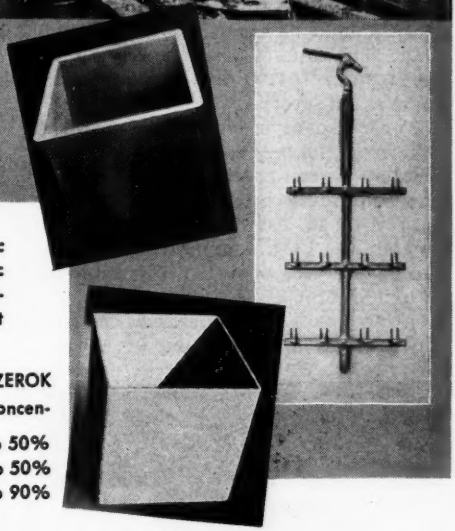
Corrosion-Proof LININGS and COATINGS for TANKS and RACKS used in Metal Finishing





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FOR STEEL and CONCRETE—Atlas ZEROK Synthetic Resin — Withstands these acids in concentrations listed:

Nitric.....up to 50%
Chromic.....up to 50%
Sulphuric.....up to 90%

These linings are factory-applied with brush or spray, to build up to required thickness. ZEROK is used also to protect structural members of steel or concrete.

ATLAS FLOORS are proof against any specified acid, alkali or solvent. They retain their smooth surface and withstand heavy traffic and severe mechanical punishment. Units of Atlas Construction need no time out for repair, and maintenance cost is practically nil.

Atlas offers *complete service:* materials, design and, when desired, supervision of installation. Our engineers will gladly study your acid-proofing problem, make recommendations and submit plans and estimates — all without obligation. Contact our nearest branch. And write us at Mertztown for recommendations.

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terials And Methods" in a tabulation prepared by Edward Rosen and George Black. These treatments may be of value to finishing engineers dealing with Monel metal. For removal of tarnish a dip in a solution consisting of 1 gal. nitric acid and ½-¾ lb. common salt added to 1 gal. of water, followed by a dip in a solution consisting of 1 gal. nitric acid diluted with 1 gal. of water was recommended. A hot water rinse should be used between dips. A treatment time of 5 seconds at a temperature of 70-100 deg. F. was stated to be satisfactory.

For removal of reduced oxide the following pickling solution was recommented: water 1 gal.; sulfuric acid ¾ pt.; sodium nitrate ½ lb.; and common salt 1 lb. A treatment time of 30-90 minutes at a temperature of 180-190 F. deg. was specified. For removal of oxide film or scale a double dip treatment was recommended. The first dip consists of a solution of ½ gal. hydrochloric acid and ¼ lb. cupric chloride in 1 gal. of water at a temperature of 180 deg. F. using a dipping time of 20-40 minutes. This treatment is followed by a 5-10 minute dip in a solution made up of 1-1/10 lb. sodium dichromate in 1 gal. of water, using an operating temperature of 108 deg. F. For the removal of embedded iron particles from the surface of Monel metal, treatment in a solution of 1½ gal. of hydrochloric acid diluted with 1½ gal. of water was recommended.

* * *

Paint Distribution System Plays An Important Part In Efficiency Of Finishing Operations

AN outstanding feature of a modern conveyorized finishing setup described by Walter Schmid, Stewart-Warner Corp., in a recent issue of "American Machinist" (Jan. 13, 1949) was the efficient method of paint distribution which was developed. It was pointed out that the system is capable of supplying eight different paints to eight spray gun operators. Four recirculating paint supply lines have outlets at each of four primer-coat spray stations; in addition, five outlets are available at each of four finish-coat spray stations. According to Schmid's description of the modern finishing setup, eight paint supply lines and eight return lines made of 1 inch diameter seamless steel pipe connect the spray booths with the paint mixing and pumping room which is maintained in a separate building to localize fire hazards. Normally, it was pointed out, three pipe circuits are used for primer-coat materials, three for finish-coat enamels, one serves as a spare for either primer or finish coats, and one is a spare for finish coats only.

About 3500 feet of 1 in. pipe are used in the paint supply network. Between

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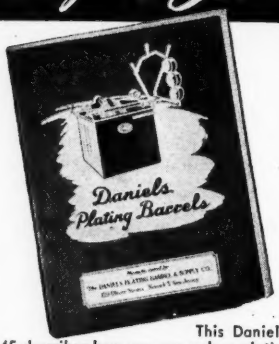

This Daniels catalog D-45 describes how you can reduce plating costs and keep rejects to a minimum. See the many unique features of the DANIELS Type OLS Plating Barrels. Choose the unit from the standard specification sheet to handle your plating requirements.

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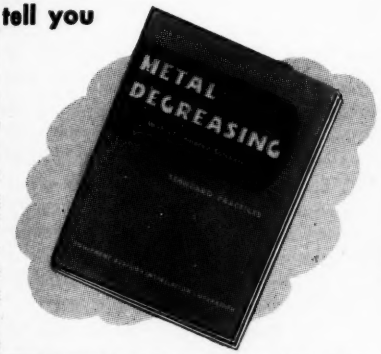
NEW, IMPROVED "TRICLENE" D TRICHLORETHYLENE HELPS YOU GET TROUBLE-FREE OPERATION

This new solvent is by far the best commercial solvent yet developed by Du Pont for metal degreasing. It stands up against contaminating and destructive materials which may be introduced in degreasing . . . assists materially in carrying out speedy, economical, efficient cleaning.

Let this book tell you



READ HOW Vapor Degreasing can simplify production . . . save you time and unnecessary costs. Read why the results obtained can't be matched by any other method. It shows typical compact equipment available for efficient and economical operation. And it gives information about solvents used in this equipment—Du Pont "Triclene" D Trichlorethylene, and Du Pont Trichlorethylene and Perchlorethylene—which under various trade marks have been widely used for many years. Send for it today!

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buildings the 16 pipelines run through a 4 by 4 foot duct, supported 7 feet above the ground. Walls of the duct are heavily insulated so that outdoor temperatures will not affect the rate of paint movement. The duct is large enough to permit any needed maintenance operations.

It was pointed out that each spray booth uses approximately 55 gallons of paint each 8-hour shift. This is delivered at 40 p.s.i. and is reduced to 20 p.s.i. at the spray guns. In the paint mixing and pumping room are eight individual paint distributing units, one for each supply circuit. Each consists of a mixing tank and a paint circulating tank. It was pointed out that the tanks are standard 54 gal. steel drums, standing on end. Paint is forced into the pipe circuit and back to the circulating tank with a standard Alemite Model 7808 air-driven Verstal pump capable of delivering approximately 3½ gallons per minute. It was brought out by Schmid that each pump can accommodate four or five spray guns under normal operating conditions. To assure delivery of clean finishing materials at even pressures, it was stated that there is an Alemite Model 307980 surge eliminator and a Cuno filter in each supply line, and a pressure regulator on each return line.

Finishing engineers should keep in mind that a well engineered paint distribution system makes for added efficiency in metal finishing operations.

Finishes for Aluminum. Revised edition. 124 pages, 37 illustrations, 26 tables, 3 indexes. Wire bound, 3¾ x 8¾ inches. Published by the Reynolds Metals Co., 2500 S. Third St., Louisville, Kentucky.

This publication is a revision of the two-volume "Finishes for Aluminum" published in 1946. It brings the subject up to date by supplying some additional information and combines volumes one and two into a single convenient reference book.

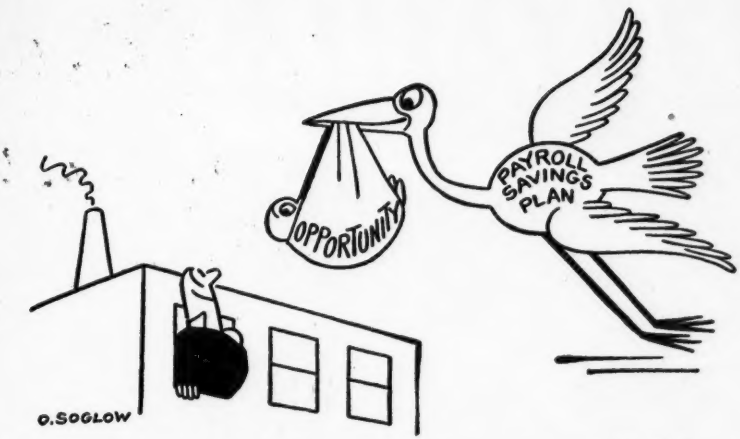
The book includes chapters on characteristics and properties of aluminum, cleaning treatments, mechanical finishes, chemical treatments, electrolytic oxide finishes, electroplated finishes, organic finishes, special purpose finishes, controls and tests.

"Finishes for Aluminum" is available free to engineers, metallurgists, finishing department foremen, and other officials requesting it on their company letterhead.

NOVEL TRADEMARK FOR PLATED PRODUCTS.—A novel trademark for its process of combining both gold and chrome plating on a single unit of die cast metal has been developed by the Continental Die Casting Corporation, a division of F. L. Jacobs Co., Detroit, Michigan.

The new trademark is being cast in place on each product employing the process. In the center of the diamond-shaped trademark is the word "GOLDn' KROME," as can be seen in the accompanying illustration. At either end are the symbols "Au." and "Cr." of the elements gold and chromium. Above and below are the words "Single Unit" and "Plating Process."

The Continental process has met with widespread interest in the trade since it was first made public. Although it was used initially in making an ornamental hardware product for the automotive industry, the process can be widely used in the manufacture of similar decorative products for other industries.



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Here's a program that will increase your company's chances for a prosperous future.

Experience of 20,000 companies proves this program also pays off handsomely *today*. It makes each participating employee a more contented, more productive worker. It reduces absenteeism, lowers accident rates, increases output, and improves employee-employer relations!

What Are the Five Steps?

Nation-wide experience indicates that 50% of your employees can be persuaded to join *without high-pressure selling*. Here are five steps which have proved to be the "magic formula" for putting over the Plan. They will get results for you:

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Plan's benefits to them.

4. Make a person-to-person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

All the help you need to follow this five-step program is available from your State Director, U. S. Treasury Department, Savings Bonds Division. Call him now. Or write the Treasury Department, Washington 25, D. C.

Are You With It?

In the Savings Bonds campaign, May 16-June 30, the Treasury Department asks you to canvass all your employees, with the goal of having at least half of them on the Payroll Savings Plan by June 30th.

The Treasury Department acknowledges with appreciation the publication of this message by

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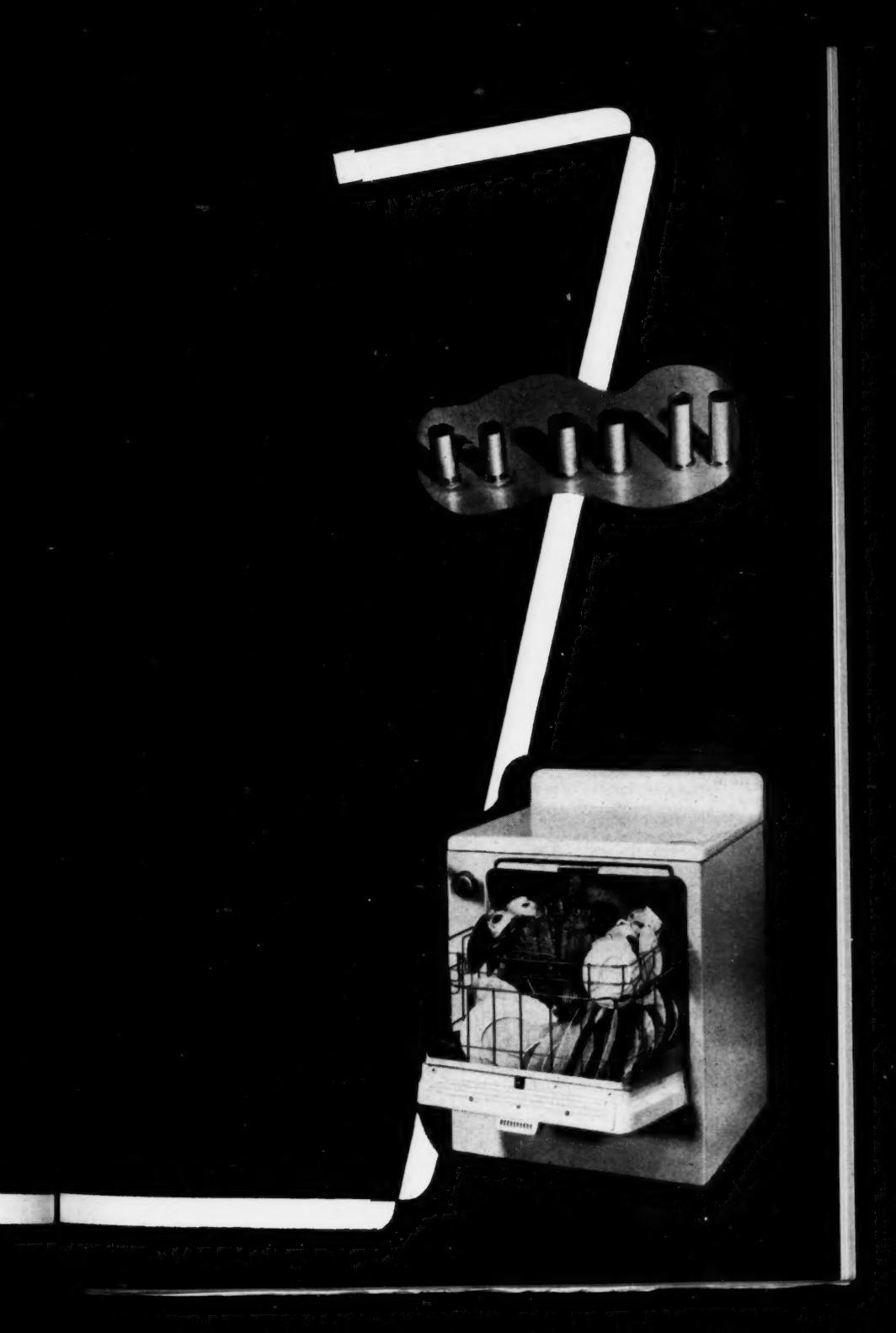
This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

FINISHES



NEWS of the Industry

COMPANIES

MONSANTO CHEMICAL COMPANY and **AMERICAN VISCOSE CORPORATION** have joined in the formation of a new company to engage in research and development work in the field of synthetic fibers. The corporation, as yet unnamed, will be headed by Dr. Carroll A. Hochwalt, a Monsanto vice president, and will pursue its research and development work through the laboratories of Monsanto and Viscose.

Other officers of the company will be Dr. Charles S. Venable, director of chemical research for American Viscose, who will be vice president of the new corporation, and F. William Koster, also of American Viscose, who will be secretary-treasurer.

J. F. Roche, president of **BINKS MANUFACTURING CO.**, Chicago, Ill., has announced the enlarged facilities of its direct factory sales and service branch at 1231 W. Ninth St., Cleveland 13, Ohio. Branch manager in charge of sales and service in Ohio is B. R. Fulton, who was recently appointed.

FUCHS & LANG MANUFACTURING COMPANY and the **RUTHERFORD MACHINERY COMPANY**, divisions of Sun Chemical Corporation, are now established in the Sun Chemical Building, 10th St. & 44th Ave., Long Island City 1, New York.

Under the management of Dr. H. B. Walker, a new product development department has been established by **E. F. HOUGHTON & CO.**, Philadelphia, Pa., manufacturer of industrial oils, chemicals, and leathers, according to an announcement by G. W. Pressell, executive vice president.

All officers of the **D. J. MURRAY MANUFACTURING CO.**, Wausau, Wis., were re-elected at the annual stockholders' meeting recently. They are: F. C. Boyce, president; M. P. McCullough, vice president; C. E. Staky, executive vice president and general manager; George L. Ruder, treasurer; and A. W. Plier, secretary and assistant manager.

In addition to the officers, D. C. Everest, Grover Keeth, and Paul W. Hoeper were named directors; the first two were re-elected, and Mr. Hoeper was elected to fill the vacancy caused by the death of J. S. Alexander.

ALLIED FINISHING SPECIALTIES CO., 2637 W. Grand Ave., Chicago 12, Ill., manufacturer of electro-cold strippers and industrial finishing products, has announced the appointment of the following sales representatives:

Northern half of Indiana, J. E. Bond, Box 802, Ft. Wayne, Ind.; Philadelphia, Camden, Wilmington, and Baltimore, Cal-Del Co., 837 Locust St., Wilmington, Del.; Massachusetts, Connecticut, Rhode Island, and Vermont, L. R. Dauer, 116 Newbury St., Boston, Mass.; Washington, Oregon, and Idaho, Sheldon Dunning Co., Smith Tower, Seattle, Wash.; Fox River Valley, Paul Egan, 75 S. May St., Aurora, Ill.; Michigan, Eynon-Dakin Co., 1847 W. Bethune Ave., Detroit, Mich.; State of New York west of Syracuse, John R. Feeley of the Consolidated Sales Co., Lockport, N. Y.; western Iowa, Minnesota, and Nebraska, Leo F. Fondroy, Albert City, Iowa; Metropolitan St. Louis, John W. Freudenberg, 525 W. Rock Hill Rd., Webster Groves, Mo.; California, Mission Electric Manufacturing Co., 132 W. Colorado St., Pasadena, Calif.; Minneapolis and St. Paul, Northern Products Co., 607 Pine St., Stillwater, Minn.; Ohio, Sidney P. Rosenthal, 3214 Berkshire Rd., Cleveland Heights, Ohio; Florida, C. J. Whitworth, Sr., 4342 Marquette, Jacksonville, Fla.

When President Truman in his inaugural address called upon American industry to share its advanced technological skills with foreign industries, Pennsalt International Corporation already was translating this principle into action.

The Pennsalt International Plan was announced at a recent press conference held in the executive offices of the **PENNSYLVANIA SALT MANUFACTURING CO.**, 1000 Widener Bldg., Philadelphia, Pa., by Richard L. Davies, president of Pennsalt International Corporation, import and export subsidiary of the parent company. The plan consists of direct negotiations between Pennsalt International Corporation and industries in areas friendly to the United States whereby the foreign industries may receive technological information which will enable them to expand and develop certain industrial activities. Pennsalt has already delivered technical information to industries in England and France, an action which is believed to have been the first actual response by an American company to President Truman's request.

Established for the purpose of rehabilitating industry in countries where it has been destroyed, and developing industry in countries desiring to exploit their own natural resources, the Pennsalt International Plan offers, in addition to technological information, essential raw materials and, on a temporary basis, finished products to enable client industries to serve their customers while they are getting into production.

The following men are among those now superintending operations at **THE EGYPTIAN LACQUER MANUFACTURING COMPANY'S** new midwestern division in Lafayette, Indiana.

John H. Whiteside, chief chemist, was born and educated in Scotland. During the last war he was engaged in the development of aircraft finishes, and has made important contributions to the improvement of many diversified types of industrial coatings.

The production manager is Robert B. Lett. Mr. Lett entered the industrial coatings industry as a chemist upon graduating from Pratt Institute. His 16 years of experience have covered both laboratory and production work in all types of industrial finishes, including specialty, implement, and furniture coatings. He has been associated with firms in several sections of the country.

John H. Whiteside (upper left), George H. DeVault, Robert B. Lett (lower left), Frederick J. Keller

All accounting operations will be headed by George H. DeVault who, before associating with Egyptian, was engaged in business in Lafayette.

The Midwest sales region will be managed by Frederick J. Keller, former Egyptian sales representative in Michigan. His sales region will be serviced by Hugh C. Crawford, Jr., former sales division representative for The Bakelite Corporation.

Reorganization of sales areas by the **NORTON COMPANY**, including the establishment of a new region in the central United States, has been announced by Ralph M. Johnson, vice president in charge of sales.

Donald L. Price, Detroit district manager for the company's abrasive division since 1944, has been appointed sales manager of the new region, which includes the territories around Cleveland and Detroit.

NEW POSITIONS

O. J. S. deBrun, president of The Egyptian Lacquer Manufacturing Company, has announced the appointment of **EDWARD B. BRADSHAW** as vice president in charge of the South Kearny, New Jersey plant of the company.

NILS O. BOLIN was appointed vice president in charge of Egyptian's new midwestern plant in Lafayette, Indiana.

Otto Svoboda

OTTO SVOBODA, 5629 Madison Ave., Cincinnati, Ohio, will represent George Koch Sons, Inc., Evansvile, Ind., in the southwest quarter of Ohio, northern Kentucky, and part of east central Indiana, according to R. M. Koch, general manager.

Mr. Svoboda was formerly with the E. W. Buschman Company as special sales engineer, and has also been associated with the White Motor Co., Stoney Foundry, and Robbins and Myers, Inc.

The appointment of **ALBERT H. CLEM** as assistant manager of sales of the Special Chemicals Division, Pennsylvania Salt Manufacturing Company, has been announced by William P. Drake, vice president in charge of sales. Mr. Clem, who has been field sales supervisor of the division, also will assume the duties formerly performed by **PHILIP C. STAPLES, JR.,** as product supervisor on cleaners. Mr. Staples has been transferred to the Heavy Chemicals Division as a product supervisor.

Also appointed a product supervisor in the same division is **GEORGE D. GROGAN,** formerly assistant to **R. S. ROELLER,** field sales manager. Mr. Roeller is now manager of sales of the Heavy Chemicals Division and, in addition to his present duties, has assumed those performed by **FRED PRINCE,** who has been named as chairman of the Centennial Committee.

AUSTEN F. TOMES has been appointed sales manager of the Valdura Division of the American-Marietta Co., Chicago, Ill., according to Grover H. Hermann, president. Mr. Tomes formerly was Eastern sales manager for the Truscon division of Devoe & Reynolds, Inc., and general field manager of the maintenance division of A. C. Horn Co.

Austen F. Tomes

HENRY J. LEISENHEIMER has been named manager of Export Sales of the Electric Products Co., Cleveland 12, Ohio. His first undertaking will be to set up a world-wide sales organization.

Mr. Leisenheimer formerly directed the export activities of The Cleveland Tractor Company and served in the same capacity for The Hydraulic Press Manufacturing Company.

CLAY SAYERS has been appointed by the Manderscheid Co., Chicago, Ill., as its representative in Indiana and western Michigan. Mr. Sayers has been in the metal finishing field since 1920 and has held positions as foreman, general foreman, and superintendent with some of the country's largest metal working corporations. He entered sales field a few years ago.

Clay Sayers

JOHN L. WILSON, JR., has been appointed the Pittsburgh engineer-representative of Selas Corporation of America, Philadelphia, Pa., consulting and manufacturing gas engineers.

A graduate of the Carnegie Institute of Technology, Mr. Wilson was combustion engineer for Armco Steel Corp.

Frederick L. Warner

Interchemical Corp., Finishes Division, Newark, N. J., has announced that **FREDERICK L. WARNER** has been appointed New York State sales supervisor.

With the exception of three years spent as an officer in the U. S. Navy, Mr. Warner has served with Interchemical's Finishes Division since 1936. His association began at Cincinnati.

The American Cyanamid Co., New York, N. Y., announces the appointment of **C. F. BONNET** as production manager of its Industrial Chemical Division, and **G. W. RUSSELL** as assistant sales manager of the same division.

Mr. Bonnet, who has been with Cyanamid for more than 15 years, formerly served in the capacity of assistant general sales manager of the Industrial Chemical Division.

Mr. Russell, prior to his new appointment, was manager of the New Products Development Department.

The following personnel changes in the Technical Division of the Du Pont Company's Electrochemicals Department have been announced:

DR. PAUL R. AUSTIN, assistant director of the Chemical Department laboratory at Du Pont's Experimental Station, was appointed director of the Electrochemicals Department's Technical Division. **DR. HAROLD J. BARRETT,** chemical research manager at the Niagara Falls, New York plant, was named manager of field research with headquarters at Wilmington, Delaware, and **DR. CAMPBELL ROBERTSON,** manager of chemical research at the Perth Amboy, New Jersey plant, was named chemical research manager at the Niagara Falls plant.

It was also announced that **DR. EARLE A. HARDING,** who has been director of the Technical Division, and **PAUL J. CARLISLE,** who has been manager of field research, will retire from active service at the year's end.

The following changes in district sales office personnel have been announced by The Carborundum Co., Niagara Falls, N. Y.:

R. P. COLOSI, former office manager of the Buffalo district sales office, has been appointed office manager of the Cleveland district sales office to succeed **H. P. ERBE,** who is now office manager at Pittsburgh.

H. E. Morrill has been promoted to the position of office manager of the Chicago district to succeed **R. J. NEMEC.** Mr. Nemec was appointed manager of the St. Louis office to succeed **A. L. FISCHER,** who is on a special assignment with the St. Louis office.

M. H. Corbin, president of Standard Varnish Works of New York, has announced the appointment of **CARL BAUER** as manager of industrial sales and **W. E. SANTORO** as director of laboratories.

Mr. Bauer, a graduate chemical engineer, has been active in the finishing industry for many years and has contributed technical articles to various publications. He is a member of the American Chemical Society and the Paint and Varnish Production Club of New York.

Carl Bauer (left), W. E. Santoro

Mr. Santoro, associated with Standard Varnish Works since 1930, is chairman of the membership committee of the Paint and Varnish Production Club of New York, a member of American Society of Testing Methods, a Fellow of the American Institute of Chemists, a charter member of the Forest Products Research Society, and a member of the American Oil Chemists Society.

RALPH P. STILPHEN, actively associated in various capacities in the paint, lacquer, enamel, and varnish industry since 1933, has joined the Diamond Alkali Company as a special technical sales and service representative for the protective coating field, according to an announcement by William H. McConnell, director of sales.

Ralph P. Stilphen

In his new position, Mr. Stilphen will work out of Diamond's general headquarters in Cleveland under C. S. Hancock, manager of calcium carbonate sales, concentrating on customer service matters, as well as the application of precipitated calcium carbonates in organic coating formulations.

The New Product Development Department of the American Cyanamid Company announces the appointments of **DR. JAMES R. DUDLEY** as supervisor and **JOHN D. McPHERSON** as supervisor of Market Research Activities.

Dr. Dudley joined American Cyanamid in 1940 as research chemist in the company's Stamford research laboratories. Prior to his new assignment he was assistant in charge of research on polymers and resins.

Mr. McPherson joined the company in December 1945 after his release from the Chemical Warfare Service of the U. S. Army. He formerly was assigned to the technical division of American Cyanamid and worked on engineering development of new plants.

JOHN D. RILEY has been appointed district manager of the Link-Belt Company's Newark, New Jersey office, 212 Essex Building, 31 Clinton Street, to succeed George E. Ramsden, whose death occurred on April 10.

Mr. Riley joined the company's Philadelphia plant in 1934 and since 1939 has been district sales engineer at the Boston office.

On the eve of its 100th anniversary year, **GEORGE B. BEITZEL** was elected president of the Pennsylvania Salt Manufacturing Company. He joined the company 19 years ago, and since January 1, 1949, has been executive vice president.

LEONARD T. BEALE, president for the last 20 years, will continue with the company as chairman of the board.

Also elected at Pennsalt's annual meeting were **WILLIAM P. DRAKE** as vice president in charge of sales and **WILLIAM F. MITCHELL,** vice president in charge of manufacturing.

John W. Krueger, vice president of the Evansville Division of the Seeger Refrigerator Company, has announced that **EDWARD R. WOLFERT** has joined the Seeger Evansville staff as manager of engineering and research.

Mr. Wolfert was formerly manager of the electric appliance engineering department at the East Springfield Works of the Westinghouse Electric Corporation, with direct responsibility over the design of a wide variety of electric parts and products.

Richard J. Eckart, vice president and technical director of Sapolin Paints Inc., New York, N. Y., has announced the appointment of **A. H. McKEE** to the technical staff.

Prior to assuming his new duties at Sapolin, Mr. McKee was connected for many years with the field of industrial coatings.

Leland I. Doan, newly elected president of The Dow Chemical Co., Midland, Mich., has announced the promotion of **DONALD WILLIAMS** from general sales manager to director of sales.

Mr. Williams in turn has announced the appointment of **DONALD K. BALLMAN,** former assistant general sales manager, to fill the position of general sales manager, and of **DR. L. S. ROEHM** to the post of assistant general sales manager. Dr. Roehm has been in charge of Dow's technical service and development division and will continue also in this capacity.

CORRECTION

C. H. Hohner is the new Sulphur Products Company distributor in the states of North and South Carolina, Georgia, Florida, Alabama, and eastern Tennessee.

The announcement in the May issue, page 90, was in error.

HONORS

At the 14th annual dinner party of the Arco Ten-Year Club held at the Hotel Statler, the following employees of The Arco Co., Cleveland, Ohio, received gold service pins:

JOHN C. ANDERSON, technical service representative; **HUBERT E. GIERCZAK,** service laboratory staff; **MRS. THERESA MEINZINGER,** cost department; **EDWARD P. PFLEGER,** assistant foreman, receiving department; **DALE R. RICKERT,** maintenance sales representative; and **PAUL H. SCHAEFER,** synthetic resin department.

Four members who joined the club's quarter-century section and who were awarded diamond pins are: **DANIEL C. KLOSS,** maintenance sales manager; **JOHN P. KRAVEC,** filling and packing department; **G. W. TITUS,** sales representative and **BARNEY TUHELA,** ball mill department.

NECROLOGY

FLOYD F. OPLINGER, manager of electroplating service and development in the Du Pont Company's Electroplating Department and nationally known in the electroplating field, died May 9 in the Chester County Hospital, West Chester, Pennsylvania.

Since 1933 Mr. Oplinger had held a variety of positions in the fields of metal treatment and electroplating, both at the Du Pont laboratory in Niagara Falls and in Wilmington. In December 1945 he was appointed manager of electroplating service and development. A number of patents were granted on his inventions in the field of electrodeposition of metals, and he was the author of numerous articles on that subject.

DR. ARTHUR BERKELEY YATES, formerly chief geologist of The International Nickel Company, died Tuesday, May 10, in Montreal after a short illness. He had been stationed for the company at South Africa and had come to Montreal to receive the Barlow Memorial Medal of The Canadian Institute of Mining and Metallurgy at the recent annual convention of the Institute.

A graduate of the University of California and the Harvard Graduate School, Dr. Yates had been associated with International Nickel since 1931. He wrote many articles on geological subjects.

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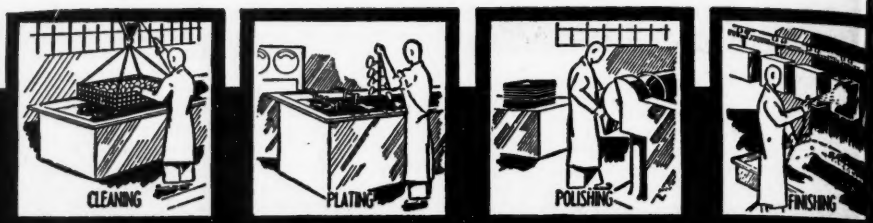


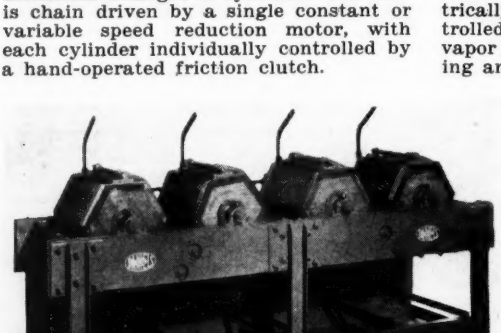
New • EQUIPMENT • MATERIALS • PROCESSES

Daniels Multiple Tumbling and Burnishing Barrel Unit

Designed for flexibility, durability, simplified operation, and economy, a multiple tumbling and burnishing barrel unit is being manufactured by the Daniels Plating Barrel and Supply Co., 129 Oliver St., Newark 5, New Jersey.

The framework of the unit is constructed of well-seasoned cypress and supported by channel iron legs. Its simplified design is said to readily lend itself to inexpensive tumbler additions or dimensional changes in cylinders. The unit is chain driven by a single constant or variable speed reduction motor, with each cylinder individually controlled by a hand-operated friction clutch.

The machine is made in multiples of two cylinder units, complete with drain pans and outlets for rapid waste removal. It can also be furnished with trays for separating work from the tumbling medium.

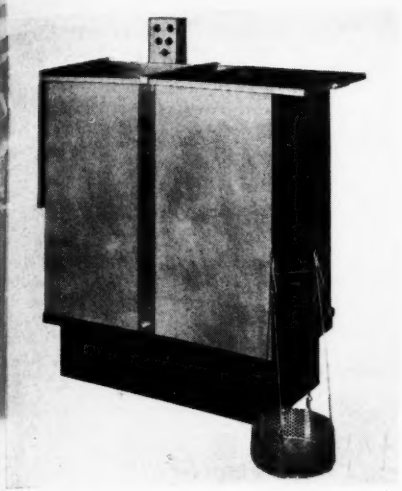


Daniels Multiple Tumbling and Burnishing Barrel Unit

Circo "Chief" Twin-Tank Degreaser

Development of the Circo Products Co., 12117 Berea Rd., Cleveland 11, Ohio, the "Chief" Twin-Tank Degreaser is electrically heated and thermostatically controlled, providing a stainless steel hot vapor tank for automatic vapor degreasing and a galvanized steel dip tank for flushing, dipping, and soaking parts to be cleaned.

The hot vapor tank of the unit utilizes 5 gallons of non-explosive and non-inflammable solvent which is vaporized by heat applied externally through 220-volt electric heating elements. A thermostat near the top of the vapor tank controls the vapor height, and prevents loss of vapor. Another thermostat, located on the underside of the tank, automatically shuts off the heat when the solvent mixture is too contaminated with grease and oil for further



Circo "Chief" Twin-Tank Degreaser

use. An indicator light shows operating conditions at all times.

The adjacent dipping and flushing tank, which is the same size as the vapor tank—18 x 18 x 32½ inches, utilizes 20 gallons of solvent, in which parts may be dipped, soaked, or flushed with cold solvent, either before or after hot vapor degreasing, or where vapor degreasing is not necessary.

The unit is also available in the "Clipper" model, which has approximately twice the capacity for cleaning and part size.

Alvin "Lab-Metal"

An all-purpose cold solder known as "Lab-Metal" has been announced by Alvin Products, Inc., Dept. 20, 20-22 Houghton St., Worcester 4, Mass. Applied with a putty knife, the solder is used to fill blow holes, sand holes, surface blemishes, and rough or porous places in metal castings and other metal surfaces.

According to the manufacturer, Lab-Metal hardens to a strong permanent bond that can be sanded to a perfect feather edge, ground and painted without the necessity of heat or special tools. It can be thinned with any regular lacquer thinner and sprayed or brushed on. It will not shrink or crack and is waterproof and rustproof, it is claimed.

Tech-Dip

Tech-Dip, a non-fuming, non-irritating bright dip for brass and copper, is being marketed by Technic Inc., 39 Snow St., Providence 1, Rhode Island.

Supplied in powder form, Tech-Dip is claimed to produce a bright smooth satin finish that is easily polished or burnished, and can be used anywhere without special equipment or drain lines.

Hammond Semi-Automatic Polishing and Buffing Machines

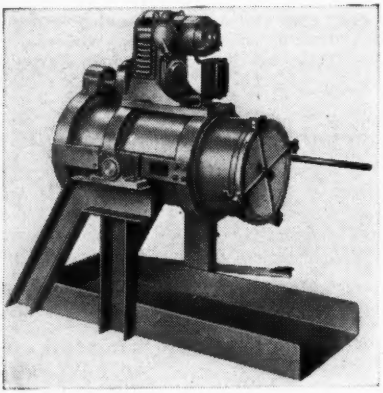
Four new two-spindle manually indexed semi-automatic polishing and buffing machines have been announced by Hammond Machinery Builders, Inc., 1625 Douglas Ave., Kalamazoo 54, Mich. Used in conjunction with any lathe or contour machine and simple and versatile in operation, the units are designed for use on such parts as hub caps, pots, pans, lamp bodies, towel rods, plumbing fixtures, and so on.

Polishing or buffing with wheels or abrasive belts and backstands with the Hammond Semi-Automatics is said to be efficiently accomplished by inexperienced operators.

Hammond Model SE2PF Semi-Automatic Polishing and Buffing Machine

Belke Improved Variable Speed Burnishing Barrels

An improved series of Belke Burnishing Barrels equipped with variable speed drives has been announced by Belke Manufacturing Co., 947 N. Cicero Ave., Chicago 51, Ill. The barrels are available in three sizes and can be furnished with either hard maple or rubber lining, or with steel ribs welded to inside surfaces.



Belke Improved Variable Speed Burnishing Barrel

The variable speed drive is mounted on top of the barrel, where it is conveniently accessible for speed adjustment yet remains dry and out of the way. Critical adjustment to any rotating speed from 13 to 39 r.p.m. is made by turning the small hand crank. Other speed ranges based on a 1-to-3 or 1-to-4 ratio can be furnished if specified.

The barrels are accurately balanced for easy tilting, the manufacturer states. A spring pressure ratchet lock, operated by a foot lever, holds the barrel securely at any angle. Patented bearing construction provides for smooth running with capacity or smaller loads.

"Karbate" Style FH Heat Exchanger

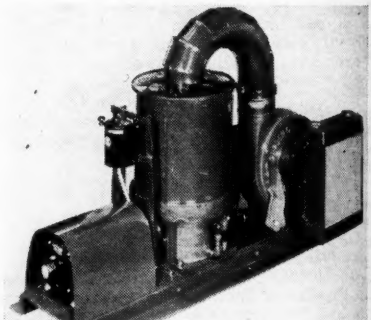
"Karbate" Impervious Graphite Style FH Heat Exchanger, Size 1½, manufactured by National Carbon Co., Inc., 30 E. 42nd St., New York 17, N. Y., is recommended for heating or cooling corrosive fluids, particularly in tanks with liquid depths up to 16 inches. It is designed for horizontal operation and consists of two Karbate impervious graphite tubes of 1½-inch I.D. and 2-inch O.D. in a parallel flow bank between Karbate headers. Connections for the heating or cooling medium are made with Neoprene Flexlock connectors.

According to the manufacturer, Karbate Brand Impervious Graphite has the properties of high thermal conductivity (three times as high as carbon steel) and resistance to the action of most acids, alkalis, and other corrosive, solvent or reducing agents, and particularly to all concentration of hydrochloric acid and nearly all concentrations of hot sulfuric, phosphoric, and acetic acids, wet chlorine, and the organic solvents.

H-VW-M Improved Centrifugal Dryer

The Hanson-Van Winkle-Munning Co., Matawan, N. J., announces that two improvements have been made in the Mercil type centrifugal dryer.

Instead of a bevel pinion on a high speed shaft with a set screw, a longer shaft has been provided, having threaded ends with SKF lock nuts and washers. This improvement is designed to eliminate the binding of gears. A flange is now provided over the rim of the dryer to prevent work from falling between the basket and the outer shell.



H-VW-M Improved Centrifugal Dryer

"Cro-Plater"

The "Cro-Plater," product of the W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn., is a complete plating unit fully

"Cro-Plater" in use

wired and ready for operation on delivery. Designed primarily for all types of chromium plating, it can also be used for other metals where the standard lead-lined tank is suitable. Plain steel, rubber-lined, or other types of tank construction can be provided in special units.

Made in one standard size, with a 45-gallon lead-lined Armco iron tank 24 x 18 x 30 inches, the Cro-Plater is electrically heated by a thermostatically controlled unit located outside and at the bottom of the tank. The equipment requires a 220-volt, 3-phase, 60-cycle, 50-ampere input; a bank of six force-cooled copper oxide rectifier stacks delivers up to 300 amperes at 1 to 15 volts for the plating operation.

Accessory equipment of various kinds is available, including a vapor degreaser unit and a cleaning unit.

Alkali Resistant Floor Enamels

Alkali resistant floor enamels, available in pewter gray and tile red, have been added to its line of paints by the Pittsburgh Plate Glass Co., Pittsburgh 22, Pa. The enamels are rubber base products for use on interior cement floors where conditions of dampness, moisture, alkali, or a combination of these elements are unusually severe, and are specifically recommended for use on areas located near chemical tanks and other places where exposure conditions are often abnormal.

A companion product, a solvent reducer, is also being introduced by Pittsburgh Plate for removing wax and grease from areas prior to painting with the alkali resistant floor enamel. The solvent reducer may be used as a thinner for rubber base enamels and for cleaning brushes or spray equipment used in their application.

Fauver Portable Transfer Unit and Filter

A portable transfer unit that also can be used for filtration of fluids has been designed and built by the J. N. Fauver Co., Inc., 49 W. Hancock Ave., Detroit 1, Mich. Mounted on a truck with an electrically driven pump are both a metal

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HEAT RESISTANT FINISH

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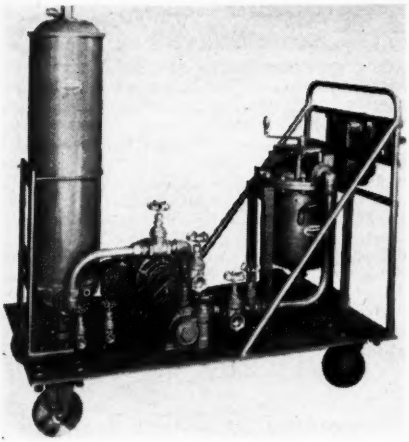


Fauver Portable Transfer Unit and Filter

edged strainer and micronic type filters. In the process of transfer of the fluid, the valves are so arranged that either one, both, or neither of the filters can be used.

Equally effective for use in cleaning batches of paint, coolant, kerosene, solvents, hydraulic and lube oils, and so on, the unit can be built to most specifications. Standard capacities are 5, 10, 15, 20, 40, 50, and 80 g.p.m. Suction and discharge hose assemblies can be supplied.

Electro-Therm Electric Immersion Heating Units

Electro-Therm, Inc., 8024 Georgia Ave., Silver Spring, Md., is announcing a line of electric immersion heating units for use in processes where sulfuric acid solutions (up to 25 per cent, boiling; in all concentrations up to 176 deg. F.) and other highly corrosive acids are present. Rated at from 200 to 5000 watts and 115 to 550 volts, the units are equipped with sheaths of Carpenter stainless steel No. 20, a new alloy having excellent corrosion-resistant properties.

Heating units can be supplied in straight lengths up to 176 inches and can be bent within a minimum radius of 1½ inches, thus permitting them to be shaped according to the user's specifications. Although regularly supplied with lug terminals, other types of terminals can be readily furnished for the heating units on request.

Multi-Barrel Tumbler

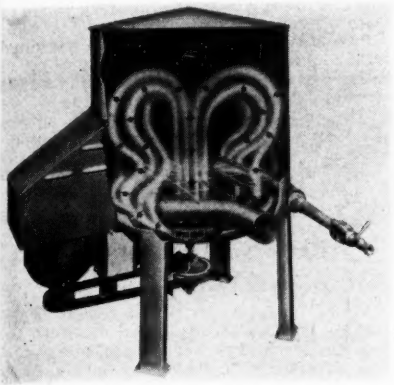
A deburring and polishing machine for the mass finishing of metal and plastic products, designated as the Multi-Barrel Tumbler, has been announced by the Hungerford Corp., Big Flats, N. Y. With the equipment, up to 15 different items can be tumbled at one time, without mixing, in the manner best suited to the requirements of each. The variables include wet and dry tumbling; a wide range of speeds; rotary, centrifugal and end-to-end actions; and combinations of these actions. Thus, all degrees of contact and impact can be obtained, and delicate parts which formerly required manual deburring and polishing can now be machine processed without danger of deformation.

The Multi-Barrel Tumbler consists of a circular mounting plate, with multiple perforations at the center and six distances from the center for attachment of the barrels, which is rotated at a fixed speed. The barrels, of numerous lengths and diameters, are of round, hexagonal, clover-leaf, or special cross-section, and can be furnished with or without Neoprene lining. They are mounted at right or other angle to the plate so as to provide for infinite selection in severity of action.

Multi-Barrel Tumbler in use

Turbo Blast

Product of The Keliher Co., 6124 Forest Park Rd., Dallas, Tex., Turbo Blast has been designed for quick and effective



Cutaway view of Model 36-A Turbo-Blast

parts cleaning. A specifically designed impeller, used in conjunction with directional fins, impels and directs the detergent, heated to the proper temperature, through the parts being cleaned and causes the detergent to strike with great force from all directions. Simultaneously with the impelling action, the orifice in the center of the impeller sucks the detergent back down through the parts.

The cutaway view presents a picture of the general flow created by joint force and suction action of the Turbo Blast impeller. The actual movement of the detergent causes a turbulence which results in an abrasive action from all angles.

Turbo Blast is available in two standard models: 36-A for large parts or a large volume of small parts, and 18-A for the cleaning of parts up to 16 inches in diameter. With the 36-A, natural or manufactured gas can be used with the atmospheric torch type heater furnished as standard equipment. A 5 h.p. motor is used. The smaller model is heated electrically and is powered with a ¾ h.p. motor.

Chlorinated Hydrocarbon-70

Development of a series of new chlorinated hydrocarbons has been announced by the Pennsylvania Salt Manufacturing Co., Market Research Dept., 1000 Widener Bldg., Phildelphia 7, Pa. Identified as Chlorinated Hydrocarbon-70, it is a clear, viscous resinoid with good thermal stability, showing no hydrolysis during 16 hours' contact with water at room temperature and at 212 deg. F. It has no flash or fire point and is compatible with such resins as vinyl chloride, styrene, and rosin, the manufacturer states. At room temperature it is completely soluble in most alcohols, ketones, and hydrocarbons.

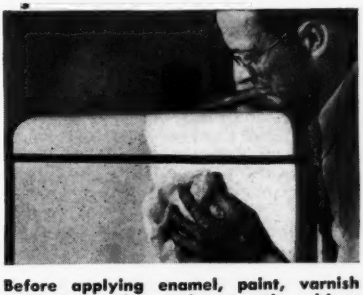
During its development, the product was subjected to a series of preliminary physiological tests and an acute vapor toxicity test. No unfavorable reactions to either were detected, according to the laboratory.

Chlorinated Hydrocarbon-70 is suggested for use as a plasticizer; as a flame retardant; in the manufacture of adhesives; and in other formulations for the impregnation or coating of textiles, etc.

Reliable "Viscolator"

Designed for preheating synthetic enamels and lacquers, and explosion-proof inside and out, the Reliable "Vis-

The Secret... of a good finish "MAGIC" TACK RAGS



Before applying enamel, paint, varnish or lacquer wipe surface gently with a "Magic" Tack Rag. It will remove specks, lint and all foreign matter—and ensure a smooth deep luster and produce a faultless surface. Order today.

WILLIAM A. JUERGENS CO.

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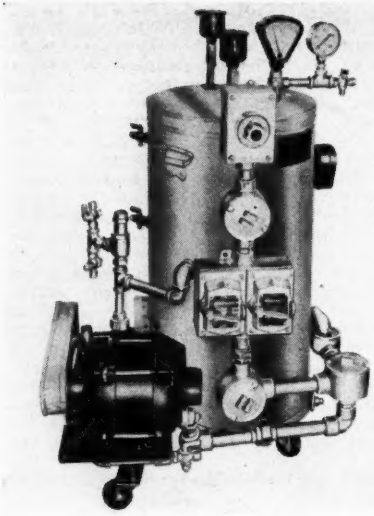


Reliable Recirculating Type "Viscolator"

colator" is being marketed by the Reliable Products Manufacturing Co., Inc., 123 DeKalb Ave., Brooklyn 1, N. Y. Instead of water, the unit employs a chemical for the heat exchange medium.

Several types of Viscolators are manufactured in capacities from 7 to 250 gallons per hour and larger to meet user's requirements. They are also available with or without hot atomizing air. The larger units are manufactured to utilize steam or electric heat, or both, and may be obtained with or without recirculating pumps for use with recirculating paint systems. The smaller units are all-electric and the pumps on the recirculating type are either electric or air-driven.

Advantages for the Viscolator claimed by the manufacturer include the increase of production, quality, paint mileage, and gloss, and the decrease of spraying strokes, operating and labor costs, rejections, and overspray.

Northwest "Number One" Water Wash Compound

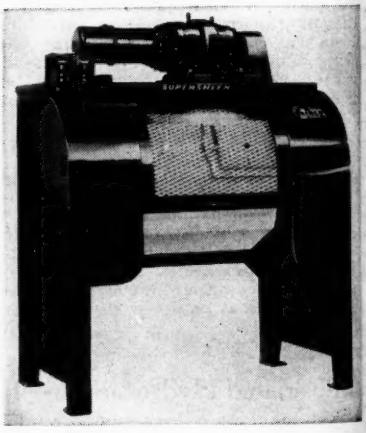
A water wash compound for paint spray booths which lubricates the overspray has been announced by the Northwest Chemical Co., 9310 Roselawn Ave., Detroit 4, Mich. Identified as Northwest "Number One," the compound coats each particle of paint with non-volatile solvent. Thus, any overspray so lubricated will not stick to the back curtain or any of the eliminators. The booth stays clean and the sludge remains floating for easy skimming.

Two advantages of the product cited by the manufacturer are elimination of down time for booth cleaning and baffle stripping, and the presence of fresh air at all times. Also the compound is said to be very easy to charge and simple to control.

Almco Supersheen Model DB-200

Almco Supersheen Model DB-200, a deburring and finishing barrel designed for greater versatility, maximum safety and ease of operation, has been developed by the Almco Division, Queen Stove Works, Inc., Albert Lea, Minnesota.

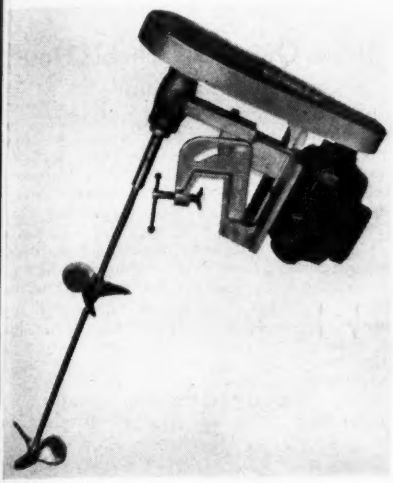
Features of the Model DB-200 include: variable barrel speed from 6 to 30 r.p.m.; rollaway perforated hood, which permits positioning of the barrel with the hood down; no protruding parts or door handles; positive magnetic break that allows inching the barrel into position; cam-operated doors for quick opening and closing; and forward and reverse safety switches. The unit is available unlined or with Neoprene lining.



Almco Supersheen Model DB-200

Marvel Mixer

A mixer so designed that it can be mounted outside the mixing tank out of the path of material splashed from the



Marvel Mixer

mixing vat has been announced by the United Electric Motor Co., 178 Centre St., New York 13, New York.

The manufacturer points out that the entire unit is always in perfect balance because the weight of both mixer and motor is carried below the center of gravity. Thus, little or no pressure on a clamp used to hold the unit on the edge of a tank or drum is required. The arrangement has the further advantage of preventing oil or grease from the motor dripping into the mixing tank to contaminate the mixture.

Other features of the recently patented mixer are described as its unlimited adaptability, low operating cost, and precise mixing speeds. Speeds can be altered by simple pulley changes, and once established, remain constant.

The unit employs V-type belts with automatic protective slippage to prevent motor burnouts when the viscosity of the mixture increases. The ball bearing spindle shaft is designed to prevent "eccentric whip." The propeller shaft may be removed easily and replaced with a longer shaft if mixing in deep tanks is desirable.

Depending upon the user's mixing problem, various types of propellers are available in stainless steel, aluminum, bronze, iron, Monel, and other metals. The mixer is furnished with either a.c. or d.c. standard or explosion-proof motors in sizes ranging from $\frac{1}{16}$ to 3 horsepower.

Belke Universal Plastic

Known as Belke Universal Plastic, an improved coating claimed to remain resilient and pliable in service, to bond to metal surfaces in a union stronger than the coating, and to be impervious to penetration by liquids has been announced by the Belke Manufacturing Co., 947 North Cicero Ave., Chicago 51, Illinois.

On plating racks, Belke Universal Plastic provides long service through copper, nickel, chrome, cadmium, zinc, and other cleaning and plating cycles, thus permitting complete plating of articles with one racking. It is also recommended for use on tanks, dipping baskets, pipes, fittings, valves, and other equipment requiring anti-corrosion protection.

NARACO

"Nationalize" to Economize

Buy Racks by NATIONAL

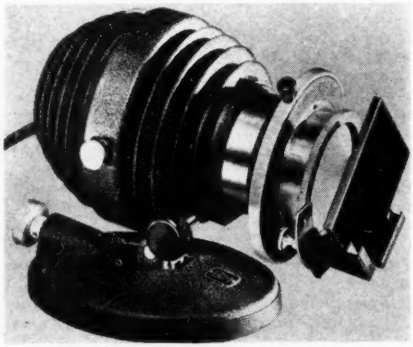
with the use of NARACO removable tips, your maintenance operation becomes a white collar job. Maintenance costs are reduced and the spline or box section of your rack becomes as close to a permanent tool as any plating rack can be.

National Rack Co., Inc.

396 RIVER ST. PATERSON, N. J.

Spencer No. 735 Microscope Illuminator

The Spencer No. 735 Microscope Illuminator, designed exclusively for routine and advanced laboratory work, has been



Spencer No. 735 Microscope Illuminator

announced by the American Optical Co., Scientific Instrument Division, Buffalo, N. Y. The unit is equipped with precise, conveniently located mechanical controls, and furnishes both Kohler and parallel illumination for bright field and phase microscopy, photomicrography, microprojection, and dark field illumination.

The Spencer No. 735 Microscope Illuminator may be obtained with or without an iris diaphragm which has both knurled ring and knob adjustments. A single filter holder for either ground or blue glasses is available; also, a multiple filter holder attachment which accommodates up to four rectangular filters simultaneously.

Pulmosan S-600 Dust Collector

To provide light, comfortable protection against pneumoconiosis-producing dusts, as well as all nuisance and nontoxic dusts, the Pulmosan Safety Equipment Corp., 644 Pacific St., Brooklyn 17, N. Y., is now producing its S-600 Dust Respirator.

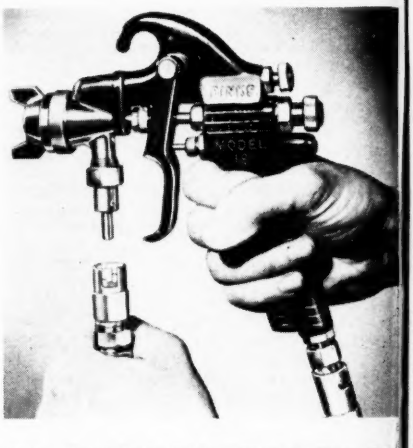
Equipped with a Bureau of Mines approved 3-inch diameter silica dust filter, the Pulmosan S-600 Dust Collector features a compact exhalation valve; improved vision aluminum body which is easily adjustable to fit any facial contour; black alumilited parts for resistance to corrosion and light reflection; double nylon elastic headbands which resist acids, alkalies, perspiration; and a rubber face cushion for snug, comfortable fit.

Binks Quick-Detachable Hose Connection

A quick-detachable connection that will shut off fluids under pressure when the hose connection is broken and instantly restore the flow when the connection is re-established has been developed by the Binks Manufacturing Co., 3118 Carroll Ave., Chicago 12, Illinois.

Using a bayonet-type joint, the Binks connection can be made or broken almost instantly with a slight turn of the wrist. Because of its fluid coupling, it will not squirt, leak, or jam when the connection is made or broken. Another feature is that there are no washers or gaskets to lose, leak, or wear out.

The quick-detachable material hose connection is a companion product to

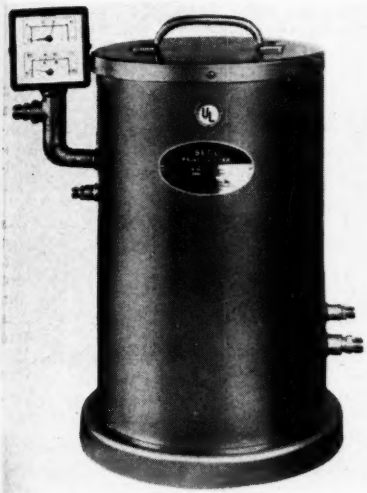


Binks Quick-Detachable Material Hose Connection applied to a spray gun

Binks quick-detachable air connection, which applies a similar principle to the air supply line. Both these units are available in standard air and material hose sizes, with standard threads to fit all Binks fittings, spray guns, and spray painting equipment.

Bede Model U Paint and Air Heater

Manufactured by Bede Products, Inc., 311 Ridge Rd., Cleveland 9, Ohio, and approved by the Underwriters' Laboratories, Inc., the Bede Model U Paint and Air Heater has been designed for spraying paints, lacquers, and synthetics with a heavier coating and a minimum number of rejects.



Bede Model U Paint and Air Heater

One of the features of the explosion-proof unit is claimed to be that no water or heat transfer liquid is necessary, since aluminum is used as the heat transfer agent between the two 1,000-watt cartridge type heaters, paint heating coils, and air heating coils. A layer of glass wool insulation surrounding the heating unit prevents heat loss, and a sturdy sheet steel outer shell provides protection against damage, it is stated by the manufacturer.

According to the manufacturer, the Bede Model U Paint and Air Heater arrives at the desired operating temperature within a period of 15 minutes, and it is accurately maintained at preset values by means of a thermostat and a thermoswitch. A thermometer records the temperature of the paint as it leaves the heater.

Murphy "Paragon C" Compressed Air Separator

Designed to remove all traces of oil, moisture, and dirt from compressed air at the point of use in conjunction with such operations as fine painting, mirror silvering, blowing dust from highly polished surfaces or from surfaces subject to corrosion, "blowing out" of precision units during assembly, and so on, James A. Murphy & Co., Fifth and Vine Sts., Hamilton, Ohio, has announced the Murphy "Paragon C" Compressed Air Separator.

Installed in the pipe line preceding the point of delivery, air enters the unit at the top right and is conducted to the expansion chamber below the strainer cartridge, where expansion and surface contact separates air and moisture. The air then rises slowly through two cotton felt absorbent pads, tightly packed between perforated brass baffles, which trap the last trace of oil, grit, and moisture, and the dry, clean air is delivered immediately to use.

Separated moisture descends by gravity to the moisture collector where it is held separate from incoming air to prevent re-absorption. Moisture may be

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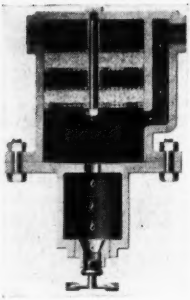
Sole Producers of

McKeon's Zinc-Brite



Cutaway view of Murphy "Paragon C" Compressed Air Separator

drained periodically by hand or the drain plug may be "cracked" to allow the fluid to readily escape without any leakage of air, it is claimed.

Chromalox Electric Immersion Heater

A series of all-stainless or all-Inconel Chromalox electric immersion heaters is being introduced by the Edwin L. Wiegand Co., 7552 Thomas Blvd., Pittsburgh 8, Pa. The screw-plug heaters can be used for heating a wide range of industrial chemicals, strong alkaline cleaners, extra-heavy degreasing solutions, oils of high sulfur content, and many other viscous and corrosive liquids which do not attack stainless steel or Inconel.

The Chromalox heaters are constructed of hair-pin shaped heavy duty tubular elements welded into a solid screw-plug with 2-inch standard pipe thread and a heavy 3-inch hex section. The heating elements are designed for high mechanical strength and excellent electrical insulation between the sheath and the resistor wire so as to provide a maximum degree of heat transfer.

Chromalox Electric Immersion Heater

Heating elements, screw-plug, and welded joints of the unit are all made of Type 347 18-8cb stabilized stainless steel, or nickel-chrome Inconel. The heated length of the element ranges from 12 to 50 inches. The heaters are normally used in water-type solutions, and are derated for use in more viscous liquids. Ratings from 1 to 15 kw. are available in voltages of 230, 460, and 550, single phase.

Enthone Nylon Electroplating Anode Bags

Enthone, Inc., 442 Elm St., Dept. PF, New Haven, Conn., has announced the development of nylon anode bags to cover nickel, copper, silver, zinc, and other metal anodes used in electroplating solutions.

The anode bags are made of sturdy nylon of 66 x 48-inch weave and are stated to be over 50 per cent stronger than comparable cotton bags. In addition, tests have indicated that the strength of these bags is maintained in both acid and alkaline solutions at temperatures up to 150 deg. F. for long periods of time.

Nylon anode bag on a nickel anode

The nylon anode bags are ordinarily supplied 4 inches longer than the length of the anode to allow accumulation of sludge, and a nylon draw cord is also provided.

Water Treatment Film. A new 16 mm. sound film in color, entitled "Water, Water Everywhere," is now available from the Ion Exchange Products Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, New York.

This 23-minute film is devoted to an explanation of what ion-exchange resins are, how they work, and what advantages demineralization by ion exchange offers in various industries. The principles of ion exchange are illustrated by animated drawings; batches of the ion exchange resins manufactured by the company are followed through research, pilot-plant, and commercial-scale production; various demineralizers are shown in operation; and the uses for demineralized water in a number of industries are illustrated.

Please mention PRODUCTS FINISHING when writing to advertisers.

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

"National" Ground Anodes and Backfill Material for use in cathodic protection and electrical grounding are the subject of Catalog Section M-8500A prepared by the National Carbon Co., Inc., Room 1328, 30 E. 42nd St., New York 17, N. Y. The bulletin describes the sizes and grades of graphite and carbon anodes available, outlines their application, installation and operation, and contains new information on backfill materials. Tables are included for determining the type, size, and quantity of ground anodes and the amount of backfill required.

"Partlow Temperature Controls and Recorders" is the title of a comprehensive brochure issued by The Partlow Corp., New Hartford, N. Y., which is made up of numerous bulletins and instruction sheets detailing the use of temperature controls for automatic gas burning and allied industrial equipment.

Included in the brochure are bulletins on gas and electric temperature controls, dial thermometers, safety gas valves, and recorders.

Folder R-2, illustrating and describing Atlas Carbo-Korez, Korez, and Alkor, resin cements for acids, alkalies, fats, oils, greases, and solvents, is available from the Atlas Mineral Products Company of Pa., Mertztown, Pa. The folder includes instructions for application, tables of physical properties and chemical resistance, and estimating data.

"Perflow," a nickel plating process which produces a semi-bright luster, levels polishing marks, and color buffs easily to a reflective finish, is discussed in a four-page bulletin available from The Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6, Ohio. Illustrations and surface analysis charts are included.

"Prufcoat Proof Packet." A standard size, easy-to-file folder of information about the use and specification of Prufcoat Protective Coatings, containing reports from outside testing laboratories, actual case histories, Prufcoat Protectograph Plan for analyzing painting maintenance costs, price list, and catalog information, is available from Prufcoat Laboratories, Inc., 63 Main St., Cambridge 42, Massachusetts.

Flock Supply. The Flock Supply & Service Co., 2221 Berwyn Ave., Chicago 25, Ill., has available a six-page catalog and price list describing Flosco synthetic flock adhesives obtainable in 12 colors to match standard flock colors, Flosco water soluble adhesives, rayon and cotton flock, static vibrators, table flocker, flock guns and parts, and other accessory equipment used in flock finishing operations.

"Soap and Soap Equipment" is the title of a 16-page well-illustrated booklet prepared by the West Disinfecting Co., 42-16 West Street, Long Island City 1, N. Y., which describes various types of liquid soaps available and the modern, functional soap equipment developed by the company to provide an economical, efficient means of dispensing the soaps.

A mailing piece describing the **"Uzall" Plating Hook** for elliptical anodes, designed to permit the entire anode to be completely immersed in the plating solution, is available from The Udylite Corp., Detroit 11, Michigan.

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila., Pa.**

"Ethyl Cellulose, Properties and Uses," issued by the Hercules Powder Co., Wilmington, Del., contains considerable new, as well as revised, information about ethyl cellulose, which can be formulated into plastics, lacquers, varnishes, film and foil, and adhesives. Many indicated applications are suggested, and an appendix is included which identifies the chemical trade names used throughout the booklet as to chemical make-up and manufacturer.

H-VW-M Bulletins FA-103 and SA-101, containing interesting information about the company's fully automatic and semi-automatic conveyors, are now being distributed by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

"Industrial Steam-Detergent Cleaning: Where and How to Use It" is the title of an eight-page service report issued by Oakite Products, Inc., 32F Thames St., New York 6, N. Y. The report includes the description of chemical materials and mechanical equipment, together with details of their use, and presents some idea of the wide range of applications for Oakite steam-detergent cleaning.

"Solving Acid Problems with Tegul-Vitrobond" is the title of an eight-page bulletin published by the Atlas Mineral Products Company of Pa., Mertztown, Pa. Printed in two colors and illustrated throughout, the bulletin describes Tegul-Vitrobond, an acid-proof, plasticized sulfur-base cement for use on tanks, floors, drains, sewers, sumps, gutters, ducts, and so on.

Turbo Blast Machine, designed for quick and effective parts cleaning, is fully illustrated and described in an eight-page folder published by The Keliher Co., 6124 Forest Park Rd., Dallas, Texas.

Resinall Metalite Belts. Thirteen production reports from various manufacturers citing advantages of Resinall Metalite Belts are contained in a four-page folder issued by Behr-Manning, Troy, New York.

"Scotch" Electroplating Tape Data Sheet, available from the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn., contains the following information: physical and chemical properties of the tape; general functions in electroplating; insulation protection; and application procedure for plating racks.

Solution Handling Shop Utensils. Perforated metal, rubber insulated solution handling shop utensils are the topic of Bulletin No. 122, distributed by the Automotive Rubber Co., Inc., 8601 Epworth Blvd., Detroit 4, Michigan.

Binks Bulletin 600. Complete illustrated information on the Binks DP Portable Spray Unit may be obtained from the Binks Manufacturing Co., 3118-40 Carroll Ave., Chicago 12, Illinois.

Unichrome Coating 218X. Uses and advantages of its improved plastisol rack coating 218X are illustrated and described in a leaflet which can be obtained from United Chromium, Inc., 51 E. 42nd St., New York 17, New York.

Potassium Cyanate. The New Products Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has published a bulletin describing physical and chemical properties of potassium cyanate and its application in such fields as pharmaceuticals, surface active agents, and baths for treating metals.

Rossaul Copper-Brite, a non-toxic, non-fuming, bright dip for brass, bronze, copper, beryllium copper, phosphor bronze, and nickel silver, is described in a data sheet obtainable from the Rossaul Co., 170 Fifth Ave., New York 10, New York.

Multi-Barrel Tumbler. Details and specifications of the Hungerford Multi-Barrel Tumbler, designed to tumble 15 different items at one time, without mixing, according to the requirements of each, are contained in a four-page folder available from the Hungerford Corp., Big Flats, New York.

The Finishing Touch

By J. A. Patterson

"Me want a drink! Me want a drink! Me want a——"

Opportunity Section

FOR SALE
LARGE PAINT BAKING OVEN

First class condition. Excellent design using slip joint panel construction with steel frame. Inside dimensions 21' long x 8' wide x 10' 8" high. Double swing doors on each end 8' wide x 10' 8" high. Gas fired with four 2" Gehnrich burners. Maximum oven temperature 400° F. Forced circulation with motor-driven Garden City blower. Complete combustion and safety controls. 4" rockwool insulation throughout, except floor. Includes 250' monorail track in double oval shape, two switches and two spur tracks, with six steel work carriers 3' x 5'.

ELECTRIC SERVICE MFG. CO.
17th & Cambria Sts., Philadelphia 32, Pa.
CALL: C. R. HUTTINGER, SAGAMORE 2-6700

LIQUIDATION SALE

Ultra-modern lacquer and finishing equipment including gas and electric ovens, automatic and manual spray booths, conveyor systems, and all accessories. Blakeslee 36" x40' gas fired, 3 stage belt type chain carrier degreaser, $5,000 (cost $13,000), Mahon gas fired oven 106' long x 13' with 500' Link Belt monorail conveyor and 18' water wash booth $4,000 (cost $25,000), Moehler oven with 300' Link Belt conveyor and 8—4'x 4'x4' DeVilbiss water wash booths $12,500 (cost $50,000), Paasche automatic water wash booth 4'x5' with 87' chain conveyor and 33' gas fired baking tunnel $3,500 (cost $16,760), and Gardner-Denver 15, 30, 40 and 50 H.P. air compressors. $50,000 cost value stock of lacquers and enamels including 2,000 gals. black wrinkle (Carlsen, Zapon, and others), 600 gals. ivory enamel (Nubian). Write for complete price list of equipment and finishing materials for sale at rock bottom prices.

DE FOE FINISHING CO.
1750 N. Kimball Avenue
Chicago, Ill. . . Al 2-0801

SALESMAN WANTED

Acquaintance among industries using spray painting equipment—to sell Paint Strippers—Alkaline Cleaners—Painting Equipment—Call on active customers and prospects from our national advertising campaigns — Unusually good opportunity for right man. Top Commissions. Beck Equipment Company, 10118 Detroit Avenue, Cleveland 11, Ohio.

FOR SALE

1,000 sections of loose cotton buffs. Will accept bids. Samples submitted upon request. Swedish Crucible Steel Co., 8561 Butler, Detroit 11, Michigan.

FOR SALE: 2,500 Safety Needle Point Tampico wheels. Never used, excellent for satinizing work on metal. 12" diameter, 1¼" hole, 20% off present market price. Ford Metal Moulding Co., 27-01 Bridge Plaza N., Long Island City, N. Y.

MANUFACTURING AGENTS

Wanted in certain sections to sell

McKEON'S

ZINC BRITE, LIQUID, SULPHUR, TIN-STRIP, ETC.

Sulphur Products Co.
Greensburg 5, Pa.

FOR SALE

Used Packer-Matic No. 4 Automatic Buffing Machine. Has 4 buffing stations each powered by a 7½ hp motor, 3 ph. 60 cycle, 1750 rpm. Has 52" dia. rotary table with 24 individual revolving spindles. Available for inspection. Swedish Crucible Steel Co., 8561 Butler, Detroit 11, Michigan.

FOR SALE — Fully equipped shop for buffing and plating, including building approximately 6,000 sq. ft. floor space. Write Box No. 63, c/o PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio.

FOR SALE—
Complete Finishing System

The very modern equipment listed below has seen less than one year's usage, and will accommodate articles 5 ft. high by 5 ft. wide by 8 ft. long.

1. International conveyor 4" I-beam conveyor with 2,350 ft. chain length.
2. Six stage cleaning and bonderizing section.
3. Thirty foot water wash spray booth.
4. R. C. Mahon prime and finish coat oven, direct gas fired, designed for 400 degree maximum temperature

Price and further details are available upon application.

BARLOW & SEELIG MFG. CO.
Ripon, Wisconsin

Triangle Infra-Red Ovens. Applications and advantages of Triangle Infra-Red Ovens are cited and illustrated in an eight-page catalog issued by the Triangle Equipment Co., Inc., 45 River Rd., Nutley, N. J. Also included are data on the company's designing and engineering service.

Vapor Degreaser Catalog. Circo "Chief" and "Clipper" Twin-Tank Hot Vapor Degreasers are illustrated and described in a catalog sheet supplied by the Circo Products Co., 12117 Berea Rd., Cleveland 11, Ohio.

"How to Protect and Repair Metal Equipment for Corrosive Service" is the title of Bulletin C-2 issued for the use of design, process, plant and maintenance engineers, and for executives interested in cutting building and maintenance costs by the Carboline Co., 7603 Forsythe Blvd., St. Louis 5, Missouri.

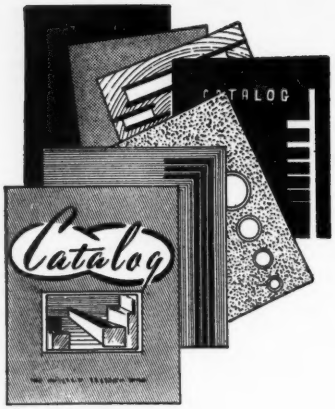
The repair of equipment which has been cracked, broken, or corroded, and the protection of new equipment for corrosive service, by means of special resins, are taken up step by step and fully illustrated. As described in the bulletin, practically any process equipment—pipe, valves, pumps, tanks, towers, reaction vessels, and so on—can be protected or repaired. Even certain parts wholly or partly missing can be made up in the plant without the delay which may be involved in filling a replacement order or obtaining an obsolete part. Repairs and protected equipment are suitable for service up to 350 deg. F. They are resistant to acids, alkalis, solvents, and mixtures of these corrosives. About the only corrosives which cannot be successfully handled are nitric and chromic acids.

Sanding Machine Bulletin. Johnson Model S-9 Sand-Air, an air-driven reciprocating type sanding machine, is illustrated and described in literature issued by the Johnson Engineering & Sales Co., 1137 H Broadway, Rockford, Illinois.

Infra-Red Data Sheet. Miskella Insulated "Spir-O-Therm" (Lampless) Infra-Red Units for baking, drying, heating, preheating, carbonizing, and dehydrating are the subject of a data sheet available from The Miskella Infra-Red Co., E. 73rd & Grand Ave., Cleveland 4, Ohio.

Fisher Electrophotometer for rapid and accurate colorimetric analysis is fully discussed and illustrated in an eight-page bulletin issued by the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pennsylvania.

"Temperature Instruments for Plating Operations" is the title of Bulletin B-296, published by The Foxboro Co., Foxboro, Mass. Each instrument is illustrated and its advantages and recommendations cited.



Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Roxaprene

A brochure outlining detailed specifications for drying, application, adhesion, flexibility, resistance to chemicals, and other properties of Interchem Roxaprene Low Bake Finish has been issued by the Interchemical Corp., Newark 1, N. J.

2. Solvent Degreasing

A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants has been published by the Detrex Corp., Detroit 32, Michigan.

3. Synthetic Resins

A 20-page technical booklet which includes a description of the properties and uses of all Hercules synthetic resins is now available from the Hercules Powder Co., Inc., Wilmington, Delaware.

4. Industrial Lacquers

A color card containing samples of the variety of colors of Pittsburgh industrial lacquers for wood and metal, together with suggestions for application of the lacquers, has been issued by the Pittsburgh Plate Glass Co., Industrial Paint Division, Pittsburgh, Pennsylvania.

5. Electroplating Tape

Physical and chemical properties of "Scotch" electroplating tape, general functions in electroplating, insulation protection, and application procedure for plating racks are contained in a data sheet published by the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn.

6. Lead-Tin Plating

General Chemical Fluorine Div., New York 6, N. Y., is distributing Technical Information Manual LTF-1 which contains extensive data on the plating of lead-tin alloys.

7. Plating Chemicals

Bulletin AC-105, published by the Hanson-Van-Winkle-Munning Co., Matawan, N. J., describes the company's complete line of anodes and plating chemicals.

8. Industrial Washing Machines

Factors to be considered in making a proper choice of equipment for thoroughly cleaning metal products are described in a 28-page book published by The Alvey-Ferguson Co., Cincinnati 9, Ohio.

9. Process Equipment

An eight-page general catalog issued by The Duriron Co., Inc., Dayton 1, Ohio, provides a brief description of a complete line of corrosion resisting equipment, including pumps, pipes, valves, etc.

10. Brass Cleaners.

Oakite Compositions Nos. 91 and 91-A for use in electrocleaning brass and other copper alloys before electroplating are the subject of a four-page service report available from Oakite Products, Inc., New York 6, New York.

11. Buffs

A folder describing in detail the advantages of Jackson Airway Ventilated Buffs is available from the Jackson Buff Corp., Long Island City 1, New York.

12. Corrosion Resistant Equipment

Haveg Corp., Newark 67, Del., has published Bulletin F-5 which illustrates by industrial application photographs and describes Haveg corrosion resistant equipment and its properties.

13. Black Finish

"Pentrate," a process for applying a protective, penetrating black finish to steel, is fully explained in a 20-page catalog issued by the Heatbath Corp., Springfield, Massachusetts.

14. Bright Nickel Plating

Udylite Bright Nickel Plating Process and its advantages are the subject of Bulletin 51, distributed by The Udylite Corp., Detroit 11, Michigan.

15. Synthetic Finish

"Dimenso," a synthetic finish that is designed to provide two colors in one spray operation, is described in a booklet now available from The Sherwin-Williams Co., Cleveland 1, Ohio.

16. Alodizing

A rapid, effective, and economical process for protecting aluminum and anchoring paint is described in a four-page illustrated technical service data sheet released by the American Chemical Paint Co., Ambler, Pennsylvania.

17. Parts Washers

Bulletin No. 91, published by the Optimus Equipment Co., Matawan, N. J., describes the Optimus line of washers and degreasers.

18. Infra-Red Ovens and Conveyors

A 20-page catalog published by Jensen Specialties, Inc., Detroit 27, Mich., illustrates and explains the advantages of coordinating infra-red ovens with conveyors in performing baking, drying, preheating and dehydrating operations.

19. Dust Eliminators

A 12-page folder prepared by Schmieg Industries, Inc., Detroit 2, Mich., presents illustrated, descriptive, and blueprint data on a complete line of swirl type dust and fume eliminators.

20. Parkerizing

A catalog describing applications and advantages of Parkerizing has been issued by the Parker Rust Proof Co., Detroit 11, Mich. Coatings obtainable by Parkerizing various products such as forgings, castings, stampings, and so on, are discussed.

21. Refinishers' Price List

The Rinshed-Mason Co., Detroit 10, Mich., has available Refinishers' Price List No. 107 which lists and describes each item of its line of automotive undercoats and finishing materials.

22. Industrial Ovens

The Kirk & Blum Manufacturing Co., Cincinnati 25, Ohio, has published a descriptive catalog showing installation views of its wide variety of industrial ovens in various types of plants.

23. Silicone-Base Finish

Properties of Mico silicone-base aluminum finish and product applications for the finish are outlined in a folder issued by Midland Industrial Finishes Co., Waukegan, Illinois.

24. Nickel Activator Bulletin

A bulletin describing "Chrometex," a nickel activator used to increase the covering power of chrome, and its application is available from MacDermid Inc., Waterbury 88, Connecticut.

25. Clear Lacquer

The Randolph Products Co., Carlstadt, N. J., has issued a folder which contains helpful, technical, and factual information on clear lacquer.

26. Air Compressor

The DeVilbiss Co., Toledo 1, Ohio, has issued a four-page folder describing and illustrating its NCD Air Compressor for the home workman, small service shop, or as an auxiliary unit for the painting contractor.

27. General Purpose Cleaner

A four page folder published by the Pennsylvania Salt Manufacturing Co., Philadelphia 7, Pa., describes Pennsalt MC-1, a cleaner for general maintenance use, steam gun cleaning, and tumble barrel cleaning.

29. Finishing Equipment

A brochure describing Mahon industrial finishing systems is available from The R. C. Mahon Co., Detroit 11, Michigan.

30. Chromium Plating

A bulletin describing the advantages of "Mechrome," a bulk chromium plating process, and "Nuchrome," a new chromium plating solution formula, has been published by Chromium Engineers, Inc., Chicago 16, Illinois.

31. Degreasing Solvent

A leaflet outlining the details of an improved Blacosolv Degreasing Solvent which incorporates new and improved stabilizers can be obtained from G. S. Blakeslee & Co., Chicago 50, Illinois.

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